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'*Knowledge is proud that he has learned so much,*
Wisdom is humble that he knows no more.'—COWPER.

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Hygiene.

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CLOTHING AND MODES OF DRESSING—(*continued*).

Wool has the property of shrinking considerably when washed in hot water, so that its usefulness is impaired by being worn, and also by age. In cleansing woollen garments hot water is to be avoided, all rubbing as usually practised is injurious, and they should never be wrung out for the purpose of drying, for these and other reasons stated above, new flannel is much more satisfactory to use than old: the unscrupulous manufacturer is at work to turn old things into apparently new articles, and wool is so treated. *Shoddy*, as the stuff is termed in the market, is to be discovered by a microscopical examination which shows a wool that has lost its softness and thickness. It is made out of old garments which have had their texture destroyed. The materials are re-manufactured into cloth. Solution of potass is more active in its action upon Shoddy than upon new wool.

Silk is a tissue which is formed by some of the insect tribes. The raw material out of which it is made is secreted by some of that class which undergo a perfect metamorphosis; and are furnished in their larval stage with so-called spinning organs. The secretion is colourless, and comes from two coiled up glands, terminating by ducts in a so-called reservoir. Any colour which the silk may have, is derived from a varnish-like material contained in the reservoir, and with which the fibres are coated as they issue from the receptacle; it is this varnish which gives to silk its power to resist the action of water. The larvæ form a kind of case called a cocoon, in which the pupa is preserved whilst advancing in its further development into the perfect insect. Silk is obtained from those cocoons by winding it off before the metamorphosis is perfected. The fibres are cylindrical, but somewhat flattened. They are quite solid, highly refractive, and without any kind of markings which might indicate structure.

The silk of commerce is derived from the *Bombyx mori*, a name which indicates the nature of the food of the creature, viz., the leaves of the mulberry tree. It has been called the 'dog of insects,' for it has been domesticated from very early periods. Silk was first introduced into Rome from the East by Julius Cæsar, and marks the commencement of an era of luxuriousness which brought about the downfall of the Roman Empire. The Peloponnesus of ancient times became the Morea of the Middle Ages, in consequence of the introduction of the silk industry and the cultivation of the mulberry tree in that part of Greece.

Silk is now produced to a very large extent in Southern France as well as in China. It is soluble in chloride of zinc, which does not interfere with cotton and wool. It cannot be produced except it be spun by the larvæ itself, though efforts have been made to extract it from the mulberry leaves or from the bodies of the larvæ before it is formed into threads.

Silk shrivels up in flame, and does not burn in the way that cotton does. It is warmer than cotton, and is more comfortable to the skin to those who have great sensitiveness. It is thought to be more healthy than woollen, but this is an error. It is less useful than wool, because the friction which it produces is less decided than that which results when woollen garments are worn as underclothing. Silk stockings are worn by the "upper ten" for two or three reasons: 1st, they are expensive; 2nd, they are thinner than either cotton or wool, whilst their impermeability causes them to be comparatively warm. It is worn next to the skin as an undergarment by those who can afford its use, because it is clean; it is not so porous, does not irritate the skin (which is its greatest disadvantage), for the friction which flannel brings about assists to remove used-up epidermis, and to keep the skin in more perfect order. It is not so healthy, therefore, as flannel, but more comfortable, and altogether warmer than cotton, from its comparative impermeability and its resistance to the action of moisture.

Leather is used for clothing, either as dressed skins, with the hair or wool remaining attached to the skin, or as sheepskin or washleather. It is scarcely porous, and is therefore very warm and fitted for use in arctic

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climates. It is used also for shoes, leggings, and occasionally for trousers, and is invaluable for overcoats for those who are obliged to do duty out of doors in severe winters, but it is not a proper article for use in hot climates. The custom which some persons have of wearing washleather next the skin is a most objectionable one; the article becomes coated with epidermis, and soaked with perspiration, until it is a mass of impurity. This habit should never be encouraged. Articles which are comparatively indestructible may be used for overclothing, but are not fitted for use next the skin unless they can be washed frequently.

Waterproof clothing, because of its impervious nature, is very hot; it retains perspiration and condenses moisture; its only use is as a protection against rain, and there should always be woollen garments as underclothing when it is so used; it is, then, invaluable in stormy seasons, but must not be close fitting.

Feathers are used mainly for bedding purposes; as swan's-down, it is formed into a comfortable fur for delicate people, but it is not a safe article for use unless frequently washed, as it may easily retain infection. Feather beds are not the most healthy beds to lie on; they are relaxing. The harder the bed, consistent with some comfort, the greater will be the ultimate benefit derived from the rest. Feathers become matted together by absorbing perspiration, and when used they should be dressed under steam occasionally, and always after having been slept upon by an invalid. It is probable that a good many of the cases of puerperal fever which arise sporadically are caused by the discharges from the lying-in female finding their way into the bedding by accident.

Putrefaction is set up, and germs of a noxious kind find their way into the bodies of the patients, the result being puerperal or child-bed fever. The greatest care is requisite on the part of the nurse when bedding has been soiled on such occasions.

Mattresses should be made of wool, or horse-hair in preference, and feather beds discarded from ordinary use. Chaff is sometimes used by the poor; it is clean, but does not retain the same amount of warmth as wool or hair. At some parts of the sea coast a good kind of mattress is made from the *grass wrack* (*Zostera Marina*), an aquatic plant belonging to the *pond weed* tribe. The dried stems and leaves are very satisfactory stuffing for mattresses; they are also used for the purpose of packing glass, and when thoroughly dried do not get damp at the approach of wet weather, as sea-weeds generally do.

Bed coverings should be light and porous, and yet bad conductors of heat. A swan's-down bed cover, when it completely covers the bed, is comfortable, but it requires occasional re-dressing. Heavy bedclothes are to be avoided. In cold weather a considerable addition to comfort and warmth may be obtained by placing a newspaper over the bed; it will be almost equal to an additional blanket, without the weight, and may be removed as soon as the severe cold has given way to milder weather.

Mattresses are now being made of wire in the form of springs; they are very useful in situations in which parasitic life abounds, as they can be kept quite free from vermin without difficulty.

General Conclusions.—Our garments should be soft and pliable, so as not to interfere with the free use of the limbs. Underclothing should be made of substances easily cleaned or washed. It is always prudent in this changeable climate to wear flannel next the skin, especially in hot seasons, and not to put on too many coverings. To be overclothed is to weaken the system. It makes a child tender and more liable to take cold than when the clothing is scantier, yet it should be sufficient. It is cruel to expose the bare legs and arms of very young children in cold weather, with the idea that by so exposing them they are being hardened. It leads to as much mischief as overclothing may do. All dresses should be loose and easy, and graduated somewhat according to temperature. A sunlight bath in diaphanous clothing is extremely beneficial to very young children in hot weather. Those children who are scantily clothed in temperate climates have better formed bodies, and are freer from deformities than overclothed children, who will be weakly and delicate. To allow them to paddle about on the sands at the seashore without shoes or stockings in warm weather, tends to develop the feet and give strength to the body generally. If young children did not use shoes and socks at all when the thermometer is above 60°, they would be much the better for it, and much less liable to sore throats and other diseases which are supposed to be consequent upon taking cold or getting wet feet. High heels and pointed toes in shoes are much to be deprecated; so are ligatures of all kinds, whether round the waist, or as garters about the legs, or as tight ligatures about the throat. The use of stays by females is quite unnecessary as far as health or figure is concerned, and the divided skirt now coming into use by females is a great improvement upon the petticoat which is usually adopted as underclothing. It is much to be desired that our females should dress with greater attention to hygienic laws than they have been accustomed to do. Men will be wise to avoid the waspish waist as indicative to some extent of the narrow understanding which is possessed by those who try to compress themselves into a circumference several inches smaller than nature intended. Such compression can only be obtained at the expense of health and comfort in later years, as well as assisting to produce a crabbed and irritable state of mind.

Injurious Dyes.—It has been proved that some articles of clothing have had their colour changed by dyeing them with materials which have affected the wearers when some decomposition has taken place in their tissues. Some of the dyes which have obtained great favour for their brightness of colour have been found to produce an erythematic rash upon the parts of the skin to which they have been applied; socks have so affected the feet as to produce vesication or a kind of eczematous rash; the same effect has been produced by the use of gloves similarly treated. When such results are discovered the articles should be discarded, and the shops at which they have been purchased carefully avoided in the future. Some articles have had arsenic put in their composition for the sake of colour. Artificial flowers, coloured green by means of arseniate of copper, have been supposed to have produced mischief to the wearer. The greatest mischief results to those who manufacture them, and for this reason their use is to be discouraged. Furs have been dressed with materials setting up irritation on the skin, though this effect is probably due more often to the parasitic life which may be harboured

in such articles; whether it be connected with the insect world or with the fungi, both kinds cause great irritation on some skins; the articles having been put aside during summer without being properly dressed and protected from insect and other ravages. All articles which have been stored away for some time should be carefully examined before they are worn. It is always safer to expose them to the broad sunlight before being used, or to put them into a disinfecting chamber, so that they may be exposed to a temperature of not less than 220 degrees; by this means both animal and vegetable life are destroyed, without injuring the texture of the fur or skin.

(To be continued.)

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The New Class-Subject, 'Elementary Science'

(What to teach, and how to teach it.)

BY RICHARD BALCHIN.

(*Continued from page* 200.)

THE syllabus for one year's course of lessons in this subject for Standards VI. and VII. appeared in the June issue of this magazine. It is there seen that I am now describing a scheme of work for the boys, that will not only be suitable for the class-subject 'elementary science,' but also for the second stage of the specific subject 'chemistry.' In Lessons V., VI., and VII., I have dealt with the question of chemical combination, and as this is regarded by many teachers as beyond the capacities of children, I have given, somewhat in detail, my method of presenting the subject to boys; and have likewise taken the opportunity of submitting to my readers the successive steps by which the scholars may be led to have an accurate though elementary conception of what is in reality the very foundation of our science. Pursuing this plan, we have:—

LESSON VIII.—THE ATOMIC THEORY.

Recapitulate what has been said of the laws 1 and 2 of chemical combination. Get the boys to see clearly that if we consider the smallest quantity by weight of hydrogen that enters into combination as 1, then that of oxygen will be 16, of carbon 12, and so on. Thus to every element we have associated a certain number, which, so far as we have gone, represents the combining proportion by weight of the element as compared with hydrogen. Here it may be pointed out that we are now in a position to give a more scientific distinction between a mechanical mixture and a chemical compound, than was the case before we knew anything of these laws: namely, that in a mixture the materials may be placed together in any quantities we choose; we may, for instance, stir together *any* quantity of iron filings *with* powdered sulphur; but when these bodies enter into chemical combination, there are fixed quantities of the respective parts. If I chemically combine the iron filings with the powdered sulphur, through the agency of heat, and then analyse the compound produced, I find that only 56 parts by weight of the iron have combined with 32 of the sulphur, whatever may have been the amounts in the previous mixture; the excess in either case being left uncombined. Give other examples, so as to make this point quite clear.

Now, if the boys have been taught to think and encouraged to ask questions, some bright youngster will be sure to put up his hand and ask, 'Why is this?' 'Why should mercury and oxygen, for instance, combine in the ratio of 200 to 16?' 'Why do calcium and chlorine combine in such a way that we always find 40 parts by weight of the former to 35½ of the latter?' Also, is there any reason for the curious regularity that if a greater number, say of grains of oxygen than 16, combine with 56 grains of iron, that greater number must be either 32 or 48, or some other multiple of 16? Why can't we combine 20 grains of oxygen with 56 grains of iron? Lead on the boys to ask such questions, and let them, if they can, suggest explanations. Criticise their suggestions, and let the matter stand over until the next lesson; telling the boys, in the meantime, to think about it, and try by next week to give an explanation of this one fact:—That pure 'water,' in whatever form we find it, whether as invisible vapour, or visible steam, or liquid water, or snow, or solid ice, is always composed of hydrogen and oxygen in the ratio of 2 to 16, by weight.

NOTE.—I cannot forbear mentioning two interesting facts illustrating the advantage of thus propounding a query, and setting the boys to think out its solution. About eighteen years ago I was giving a course of lessons on the steam-engine. We got as far as noting the necessity of having some contrivance for admitting the steam alternately above and below the piston. The boys had to think over the matter by the next lesson, and try and solve the difficulty. Perhaps my readers will scarcely credit it, yet it is a fact; one of the boys, without any previous knowledge whatever of the subject, actually hit upon the principle of action of the 'D' valve! That boy is now an electric engineer, and has himself registered several improvements in the telephone.

Fact number two happened in the Gloucester Road Board School. I was giving a lesson on the parallelogram of forces, and drew an arrow on the blackboard to show the direction of a force acting upon a certain point represented by a ball. I divided the length of the arrow into 12 equal parts to indicate the intensity of the force as compared with another force acting upon the same point, but in a direction at right angles to that of the former force, and represented by another arrow divided into six similar parts. The points the boys had to find out by the next lesson were—1st, in what direction the ball would travel if acted upon simultaneously by both forces? and 2nd, with what force it would travel as compared with the two unequal forces that set it in motion? I was astonished when I found that a boy brought on a piece of paper a copy of my blackboard sketch, to which he had added a line to show the resultant, which, when I completed the parallelogram for him, coincided exactly with the diagonal!

LESSON IX.—THE ATOMIC THEORY.

Criticise the suggestions of the boys upon the points noted in the last lesson. Then lead to Dalton's supposition of the divisibility of elementary matter into ultimate particles called 'atoms.' Explain what this means. Note that the existence of 'atoms' is at present a supposition only. If there be such a thing as an atom, show how very minute it must be. The smallest particle of water in the invisible vapour of the

air is yet made up of three atoms. The smallest of the microscopic animals in stagnant water yet exhales countless molecules of carbon dioxide, each molecule of which consists of three atoms. Each of the starch granules which the boys have seen through the microscope in the starch-water from the potato yet contains countless particles of starch ($C_6H_{12}O_6$), each ultimate particle or molecule of which contains 24 atoms!

The outline of Dalton's hypothesis may be presented to boys in the following set of propositions:—1st, that there are ultimate particles of elementary matter called 'atoms'; 2nd, that the atoms of different elements do not weigh the same; 3rd, that an atom of hydrogen weighs less than an atom of any other element, and is taken as the unit of atomic weight; 4th, that an atom of carbon weighs 14, of oxygen 16, and so on. Hence the numbers which we have associated with the elements, and which we have hitherto termed 'their combining proportion by weight' may now receive the more concise definition of 'atomic weights.'

NOTE.—As a matter of fact—though this need not be explained to the boys—Dalton's atomic weight of oxygen was 8, of mercury 100, and so on with a few other elements. Dalton regarded 'water,' for instance, as composed of one atom of oxygen and one atom of hydrogen, and used as the formula for water HO. He did not distinguish between atom and molecule, which generally consists of two atoms in the case of elementary gases. For his hypothesis was 'that if there is only one combination of two elements, the compound must be binary,' that is, composed of one atom of each of the elements. And therefore, in the case of water (the only then known compound of H and O), taking the atom of H to weigh one, the atom of O must weigh eight. But O and H unite by volume to form water in the proportion of one volume of the former to two volumes of the latter, and 'therefore, if Dalton's hypothesis be correct, the hydrogen atom must occupy double the volume or bulk the oxygen atom occupies.' There are reasons connected with the dilation and compression of gases for rejecting this conclusion, and believing that in the same volume or bulk, all gases contain the same number of molecules. Now as one volume of oxygen is found to be 16 times heavier than one volume of hydrogen, and as in each volume there are the same number of molecules, it follows that a molecule of O must be 16 times heavier than a molecule of H, and not eight times, as Dalton considered; and therefore, the formula for water must be H_2O and not HO.—*Galloway.*

LESSONS X. AND XI.—GLASS TUBING.

The boys should now be set to prepare certain apparatus. The teacher will, in the first place, perform the operations before the boys in the class-room, and then let a certain number repeat in the laboratory what they have seen. Exactitude must be the motto for both teacher and pupil. This will furnish educative work of a kindergarten nature. The simplest work is the manipulation of glass-tubing. (1) Cut about a dozen various lengths with a three-square file. (2) Round off the ragged sharp edges by heating in the flame of the spirit lamp. (3) Bend some of the lengths to various angles in the same flame. To do this with exactitude let each boy prepare a half-circle of card, upon which mark off at the circumference a scale of degrees and join with the centre. Such a card forms what we may call our 'bending-scale.' There will be, at first, many failures. All bends must be rejected that are either twisted, or flat on the convex part, or bent up and puckered on the concave, or too sudden in the bend. (4) Make about half-a-dozen pointed tubes for gas jets. To do this well requires much practice. The common mistakes are (*a*) the points do not taper evenly, (*b*) are on one side, (*c*) in rounding off the ragged edge in the flame of the spirit lamp the point gets closed. (5) Fit some of the tubes into corks which must be previously perforated with the cork cutter. Test as to whether the fitting is air-tight. If the leakage is due to the porous nature of a bad cork show how to stop such a cork, *i.e.*, make a solution of sealing-wax in spirits of wine and paint the top of the cork.

LESSONS XII. TO XV.—THE BLOW-PIPE.

The proper use of the blow-pipe depends upon, first, the ability of the operator to keep up a continuous blast; that is to say, he must keep up a blow from the mouth while at the same time he is respiring by the nose, and, 2nd, his knowledge of the structure of flame. The former appears to be, to some, a very difficult operation. I have generally managed to get pupils to use this instrument effectively by insisting upon the following points. Press firmly the front part of the upper surface of the tongue and the whole of the outer edge of it against the roof of the mouth. This being done, we have, in the cavity of the mouth, two distinct chambers, namely, (1) that above the tongue, which is in communication with the nose, and (2) that below, which is in communication with the outer air through the mouth. Lower the surface of the tongue from the roof, but keep the outer edge of the tongue still firmly against it; air at once enters from the nose to fill the vacuum thus occasioned in chamber No. 1. Now press the back part of the tongue against the roof, and lower the front part, keeping the lips closed. Air from chamber 1, above the tongue, is forced into chamber 2, below it, and the cheeks begin to distend. Repeat this till the distention is at its utmost. Then open the lips very slightly to allow a small current of air to pass out. This fine current supplies the blow-pipe, and it can easily be kept up while the mouth continues in its distended state by fresh supplies of air from the nose to chambers 1 and 2 alternately. The boys should practise the various stages here described, using their pointed glass tubes with the flame of their spirit lamps.

(To be continued.)

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Lectures on Shakspere's 'Tempest.'

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NO. V.—ACT 3, SC. 1 AND 2.

SC. 1.

(The figures in brackets refer to the pages of the Clarendon Press Edition.)

WE now commence the Third Act, the scene of which is laid in front of Prospero's cell. Ferdinand enters, bearing a log, which he is carrying as though it were the first occasion on which he has done anything useful. His opening words, '*There be some sports are painful*,' are grammatically remarkable—first, for the use of *there be* for 'there are,' and, secondly, for the omission of the relative *which*, which word is understood between *sports* and *are*. Why does Shakspere

write *there be?* You will observe that the proper use of *be* is a subjunctive use, and we, naturally enough, expect to see it written after such words as *though* and *if*. But there are instances of the substitution of *be* for *are*, of which the only explanation is the love of euphony or even of variety.

'*Their labour delight in them sets off.*' In these words the subject is, of course, the word *delight*. In other words, the sentence means 'delight in them (that is, the pleasure we experience in doing them) sets off, or alleviates, the labour they entail.' We will venture to paraphrase what follows thus :—'Some kinds of humble employment are submitted to from a worthy motive, and most uncongenial occupations point to (or have in view) a rich reward.' For a parallel passage to '*The mistress which I serve*' the student will, of course, recollect 'Our Father *which* art in heaven.' '*Composed of harshness*' means 'of a harsh disposition.' '*Upon a sore injunction*' is an awkward phrase, but it is easy to see that *upon* means 'in obedience to'; and *sore*, of course, has the sense of 'strict.' '*Such baseness had never like executor*' is only a poetical way of stating that such menial employment was never before undertaken by so noble an individual. The word 'executor,' in modern English, belongs to the domain of legal phraseology, its meaning having been narrowed or 'specialised.'

The student may, if he likes, exercise his ingenuity upon the evidently corrupt passage '*Most busy lest*,' etc. None of the three suggested emendations—'*busie-less*,' '*most busiest*,' and '*most busy left*'—appear to make it much clearer.

Note the hyperbolical language of Miranda's speech. She wishes the lightning had burnt up the logs rather than that Ferdinand should have such trouble, and the wood, she asserts, will weep when it is put on the fire.

Statements such as these are 'a shooting beyond the mark,' which is the literal meaning of Hyperbole. Nor is Ferdinand to be outdone in his assertions by Miranda, for he says that he would rather crack his sinews and break his back than that Miranda should assist him. When Prospero speaks of Miranda as being *infected* (37), and of her state of mind as '*this visitation*,' he is using (metaphorically, of course) the language which was commonly applied to the plague. By the way, it is not altogether unusual to speak of a person in love as 'smitten,' which is another instance of the same metaphor. When Ferdinand says to Miranda, ''*Tis fresh morning with me when you are by* (*i.e.*, near) *at night*,' he means, of course, that her presence cheers and sustains him. The phraseology is much the same as in the well-known hymn—

> 'Sun of my soul, thou Saviour dear,
> It is not night if Thou be near.'

In '*that I might set it in my prayers*,' we observe that *might* is used where we should now write *may*, inasmuch as the verb that precedes it (*beseech*) is in the present tense. But Shakspere does not always observe the ordinary rule in regard to what is called the 'Consecution of Tenses.' The word *hest*, which signifies a command, has much the same meaning as 'behest'; but a glance at the Anglo-Saxon original (*hæs*) shows us that 'hest' is not a contraction of the latter. Why does Ferdinand call Miranda the 'top of admiration'? First of all, we may notice that he is making a sort of pun upon the name Miranda, which is the 'participle in *dus*' of the verb *mirari* = to admire. Mr. Wright says that the 'top of admiration' means 'that which admiration cannot go beyond.' May we not say that the abstract noun *admiration* has here a concrete meaning = 'that which is admired'? If so, the whole phrase will mean 'the best of all that is admirable,' or, in other words, 'the most admirable of all.' A sentence worthy of comment is Ferdinand's assertion, '*For several virtues have I liked several women.*' The student will do well to remember the derivation of *several* from the Latin *separo*. Ferdinand means that he has admired various women for their various (or different) characteristics. While each of these had one or two good points, Miranda's spirit was characterised by *all* the virtues. The expression '*to put to the foil*' means to nullify, obliterate, or destroy the effect of. The words '*the noblest grace she owed*' remind us that Shakspere continually uses *owe* for *owen* or *own*. In the words '*created of every creature's best*' (38) there is an allusion, Dr. Johnson thinks, to the picture of Venus by Apelles.

How ought we to parse the word *save* (38)? When it governs a case we should, no doubt, be right in pronouncing it a preposition; but it is as well to remember that *save* and *except* are both originally the forms of certain verbs in the imperative mood.

But Shakspere sometimes uses *save* with the nominative case, *e.g.*, 'save thou' and 'save I.' We must, then, consider that *save* stands for *saved*, and is the past participle used absolutely. What does Miranda mean by saying, '*How features are abroad, I am skill-less of*'? She means 'I am ignorant of the aspect (of men) in the outside world.' Miranda, it must be remembered, had never seen a man, and was therefore supposed to be ignorant of men's looks. Notice the 'redundant' use of the preposition *of* in the words '*to like of*.' The word *something*, in the same speech, is, of course, an adverb, and has the meaning of 'somewhat.' The mention of adverbs reminds us of *full* in '*full many*' (on the preceding page), and of *hollowly*, a dozen lines further on, which means 'insincerely.' What does the reader suppose our poet to mean by *wooden slavery*? Well, though in ordinary English the epithet would be most inappropriate, yet in poetry the phrase passes current for 'the slavery of carrying wood,' which employment is alluded to when the prince calls himself 'a patient log-man.' I can fancy, too, a little difficulty being caused by the lines—

> 'The very instant that I saw you, did
> My heart fly to your service; there resides,
> To make me slave to it.'

What, it may be asked, is the meaning of *there resides*? Perhaps we may best express the meaning by writing 'and remains devoted thereto.' When Ferdinand prays '*invert what best is boded me to mischief*,' he means 'change what is best prognosticated of me [*i.e.*, the very best thing that (as I and others expect) is in store for me] to something unfortunate.'

Look next at the lines (39)—

> 'At mine unworthiness that dare not offer
> What I desire to give, and much less take
> What I shall die to want.'

Don't regard the passage as a hopeless tangle, but dissect it patiently. You will notice that the subject

of *dare* is not *unworthiness* (otherwise it would be written *dares*), but a nominative has to be supplied from the preceding possessive pronoun *mine* [you will find a sort of parallel to this in the Latin Primer, § 132 (*a*)], and *dare* must be understood before *much less*. What he desires to give is his own hand in marriage, and what he says he will 'die to want' (that is, 'die for want of') is clearly the heart of Miranda. Another crabbed passage is the following:—

'Ay, with a heart as willing
As bondage e'er of freedom.'

Perhaps we may paraphrase it loosely by writing 'Yes, with a heart that is as willing to accept of it as ever a slave was willing to accept of freedom.' When Ferdinand and Miranda '*exeunt severally*,' the meaning of the statement is that they go out in different directions. *Withal* in '*who are surprised withal*' is the same as 'moreover.' The passage does *not* mean 'who are surprised *with it*.' *Business appertaining* is business that belongs to the occasion, *i.e.*, that must be performed before supper.

Prospero expresses the satisfaction he feels at the attachment that has sprung up between Ferdinand and Miranda, but observes that his joy can hardly be as great as theirs, because the novelty of their attachment adds much to its pleasure. The young people have never been in love before, and their affection for each other has all the charm of a new sensation. This seems to be the meaning of the words '*who are surprised withal*.'

Sc. 2.

The expression '*brained like us*' (39) serves to remind us that th ere aremany quasi-participles of which there exist no corresponding verbs. A little before we had '*legged like a man*,' and yet there are no verbs 'to brain' and 'to leg,' in the sense of *to furnish with* brains or legs. '*Thou may'st brain him*' occurs (42) in a speech of Caliban to Stephano, but here the verb means 'knock his brains out.' When Stephano asserts that Caliban's eyes are '*set in his head*' he uses *set* in the sense of fixed or staring. The glassy eye is one of the usual characteristics of intoxication. Trinculo purposely misunderstands him, and inquires '*Where should they be set else?*' Thus, *set* means 'glassy' in the first sentence, and 'placed' in the second.

The poet's propensity for punning appears again in the words 'he's no standard' (40). The 'servant-monster' is now too drunk to stand upright, his weak brain having been upset by the copious libations of 'sack.' In *deboshed* we have an old form of the word 'debauched.' Another attempt at a pun is apparent in the exclamation, '*Lord, that a monster should be such a natural!*' In a literal sense, what is natural, or according to nature, is the opposite of monstrous, but the word 'natural' is often used to denote a fool. It is difficult to see the connection of these ideas, but possibly 'a natural' may be intended to denote one whose mind has been left in a state of natural ignorance, unimproved by training or education. The expression '*the next tree*' is intended as a threat to Trinculo, and is equivalent to 'I will hang you upon the next tree we come to.' We have already noticed many of these 'elliptical' expressions. *Supplant* is used rather curiously in '*I will supplant some of your teeth*,' but the sense is as obvious as if the speaker had confined himself to simpler language. The use of the word *party* to denote an individual is at least as old as Shakspere's time, for we find Stephano asking '*Can'st thou bring me to the party?*' (41) where he is, of course, alluding to Prospero. The exclamation '*What a pied ninny's this! Thou scurvy patch!*' is put by Mr. Wright into the mouth of Caliban; but Dr. Johnson contends that this line ought to be given to Stephano. *Pied ninny* is, of course, an allusion to the striped coat worn by fools, of which it seems likely that Caliban would have no knowledge. If this view be correct, then Caliban's speech begins at '*I do beseech thy greatness*.' He is instigating his master to take vengeance upon Trinculo.

The verb *possess* in 'possess his books' means 'get possession of.' The line—

'Which, when he has a house, he'll deck withal,'

is properly explained as meaning 'with which, when he has a house, he will deck it,' or, better still, 'with which he will deck his house, when he has one.' The construction is certainly confused. In the next line *that* stands for 'that which,' and *to consider* for 'to be considered,' if we are to treat as ungrammatical any extension of the practice which allows us to write 'a house to let' instead of 'a house to be let,' which latter phrase, possibly in consequence of the expostulations of grammarians, is now getting into favour. The substitution of *she* for *her* in '*Sycorax, my dam, and she*,' (42) is explained by Abbott as due to the poet's regard for euphony, *she* being considered less harsh. Or, perhaps, we may consider *she* as a sort of indeclinable noun, with the meaning of 'woman.' A curious adverbial expression is '*but while-ere*' (43) in the sense of 'only a short time since.' By *catch* is meant a kind of part-song; an excellent definition of it is given in the notes to the Clarendon Press Edition. *Afeard*, for 'afraid,' is one of the utterances of Caliban, but though this word is constructed on sound grammatical principles, its use, nowadays, savours of vulgarity. *That*, for 'so that,' has occurred already in this play. It meets us again in '*that, when I waked, I cried to dream again*' (43). *By and by* stands for 'immediately' in '*that shall be by and by*.' This somewhat curious expression occurs in St. Luke xxi. 2., 'The end is not by and by.'

This brings us to the end of our grammatical observations. We may add a few words on the character of Caliban. The word itself is probably only a slight alteration of *Canibal*. On this character the critics have bestowed high praise. Mr. Rowe says: 'And that extravagant character of Caliban is mighty well sustained, and shows a wonderful invention in the author who could strike out such a particular wild image, and is certainly one of the finest and most uncommon grotesques that was ever seen. The observation which, I have been informed, three very great men concurred in making upon this part was extremely just—Shakspere had not only found out a new character in Caliban, but had also devised and adapted a new manner of language for that character.' In other words, it is considered that the sayings and doings of Caliban are wonderfully like what those of such a half-human monster would naturally be if he had been brought up like Caliban. We have not the advantage of a philosophical criticism of the character of Robinson Crusoe's man, Friday; he is certainly a far superior creature to Caliban, but

it may be thought that his character is too amiable to be realised in fact.

In conclusion, I will ask the student who has carefully prepared this portion of the play to test the accuracy of his memory by setting down the words that are here used by Shakspere as the equivalents of the nouns *companion, fool, spring* (of water), *plague, throat;* of the epithets *ignorant, rebellious, merry;* of the phrases *to act reasonably*, and *to be civil in regard to one's language;* and of the expressions *very many* and *for once.* He may also add a word or two on the employment of the adjective *brave* in the language of Shakspere's time, and quote one or two of the 'strange oaths' by which his characters were accustomed to garnish their conversation. If he do this satisfactorily, the probability is he is well 'posted' in the pages we have been considering, and may contemplate with equanimity the ordeal of a Public Examination.

(*To be continued.*)

—o—

How I Teach Domestic Economy.

BY MRS. WIGLEY.

Author of 'Marshfield Maidens,' 'Our Home Work,' Workers at Home,' 'Royal Series Domestic Economy,' 'Cookery and Home Comforts,' 'The Merryweathers,' 'Thoughts,' etc.

CHAPTER V.

WOMAN'S TOOLS.

When a young lad first starts in a trade how very much importance there is attached to the possession of tools, by which that trade is carried out. He gets together as many as he possibly can, and he seeks for good make, and excellent material also. And if by chance he becomes possessed of one of superior excellence or handiness, how jealous and proud he is about it. Lend it! ill-use it! I should rather think not. And let any one else presume to take liberties with it, I fancy they would soon be made aware that there was a breeze blowing somewhere in their neighbourhood!

And directly a boy settles his life-work, all his desires and efforts seem to shape themselves towards it. He is constantly putting into practice such skill as he may have already acquired, or trying to advance yet a step farther. He will make friends with those who are better acquainted with the subject than he is, and pick up hints from them, and he is in no way ashamed to use all and every means for getting information on the matter which is nearest his heart. In fact, he is likely to bore every one round him by continual reference to that which is always in his own mind, his future chosen occupation.

And it is astonishing how much information a lad will ferret out on any matter about which he is interested. Does he wish to keep rabbits? In how short a space of time does he get to know every other boy who keeps rabbits, within a reasonable radius. Does he mount a *bone-shaker* in order to master the first difficulties previous to becoming, some day, the proud possessor of a bicycle? There is not a bicycle for sale within two miles of which his parents are not told, and with the price of which he does not somehow get acquainted.

But, on the other hand, you or I may need a sewing-machine of a certain make, and our next-door neighbour may have just such an article to dispose of, but it is two to one if ever we find it out. We are not given to bring ourselves and our wants to the front, nor do we from our earliest years attach primary importance to ourselves or to our belongings. We know that in almost all households, children will take all sorts of liberties with mother's work-basket when they would scarcely dare to peep into father's tool-chest. We know also that any shifts are made in the performance of work on the one side, and on the other no shifts at all. Will *a man* undertake any job of work for which he is not well supplied, or will *he* do violence to his own flesh or nails by *managing* over his work, as a woman so often does? Not if he knows it, and he is right too. He knows he cannot make good work without good and proper implements, and he knows also that though he is likely to suffer from the want of them himself, his work will suffer still more. All his excellence depends on this. Only with the tools necessary can he execute any order creditably, without injury to his material, without discouragement to himself, and with satisfaction to his employer.

It is a lamentable thing that this is not the conviction of most minds with regard to *our* work also. Lately we had occasion to speak of the influence exercised on a girl's mind by the appearance she presented about her work. I am convinced that the want of proper tools to work with has an influence equally great. Alas! how few of our cottage homes are even tolerably supplied with such things. How many of our lady-visitors among the poor, when lamenting the lack of clean floors and furniture, ever think of ascertaining whether it is *the will*, or the bucket and water and brush, that is the thing lacking to make a change?

But you may say, 'What is all this to do with us? you surely are not hinting at the possibility of our becoming travelling tinkers, and of supplying these wants?'

No, certainly not. But we can do something here also.

I remember once meeting with a little girl of twelve or thirteen, who was 'keeping house for her father.' The mother had died, and there were two younger children left beside Bessie; and she had *to do* for them all. Poor child! she was in a fair way of *doing for them* in more than one sense. A picture of her forlorn little figure comes to my mind now, as I saw her once getting dinner ready. Dirty, ragged, and altogether neglected, with her short thick hair wandering in all directions, in the vain search for a parting by which to separate. A greasy frying-pan, a smoky fire, and the inevitable half a pound of steak, occupied her attention, as she did her miserable little best to produce a meal. Now, how was this child to be helped to something better? Would all the demonstrations of the most practical demonstrator anywhere, have done her any good? What was the use of telling her to make bricks without straw?

Well, I did this; I took the child to a little tinman's shop, and we invested eightpence in the purchase of a contrivance for roasting meat, and fourpence in a flour-dredger. I never purchased such a cheap shilling's worth of pleasure. Such a sudden accession of individual portable property was the turning-point in that child's life. Her

tools were beautifully kept, and bright as brightness, and by degrees they shamed other things into keeping with them. And I can safely say no individual dredger of my acquaintance was ever utilised on all possible occasions as Bessie's was in that little home. With just a lesson or two, the small damsel frothed and browned up her miniature joints *to a turn*, and a trifle beyond.

Now, don't you think that we teachers may have possibly neglected something which might have supplied a great deficiency in the domestic economy of our girl's homes? We find it desirable to encourage and to stimulate them by the award of prizes. What have we given to them? Books, almost universally, and story books too, which when once read have become useless to the possessor, and which often are the means of calling into life that love of light reading which is the bane of many a working-girl's life.

But suppose we determined to alter this state of things in future. Suppose our prizes for girls took the form of something which would be useful to them all their lives. What possible objection can there be to our making them a present of a nice paste-board, a chopping-knife, and a rolling-pin, instead of a drawing-board and a T-square? How suggestive of personal cleanliness would the gift of a set of towels, nicely made and marked, and a good sponge, be to these young ones!

And in these days the common articles of everyday use are so nicely designed, made, and finished, that no girl would hesitate to accept or be ashamed to own them.

But, of course, this sort of change should be brought about *after* the prejudice against home usefulness has been undermined through your efforts. If your children have seen you making use of certain articles, and, by means of their efficiency and your own skill, turning out dainty and delightful successes, you know how their ambition would be fired to possess and to do likewise. *Then* a similar set of tools would produce ecstasies of delight, and, like George Washington with his hatchet, they would try them on every possible opportunity.

It is a very good plan to take a lesson or two for the purpose of bringing *woman's tools* under the notice of your girls, in order that they may learn their use. It is not by any means a rare subject:—

'First among her stock we find
Needle bright, to join and bind;
Then come brushes, hard and soft,
Sweepers long, below, aloft;
Pail or bucket, pan and tub,
Chamois leathers, cloths to rub;
Scrapers, scourers, not a few,
Ancient some, and others new;
Vessels—iron, copper, tin;
Dredgers, board, and rolling-pin;
Dainty shapes, where flowers entwine,
Sieves and strainers, coarse and fine;
Mills—for hard things must be ground;
Mortars, other things to pound:
Dishes various, cutters keen,
Quite a multitude, I ween.
Men have tools, a perfect set,
For *one* trade; but you forget
Women grown and blithesome maids
Need to know *a host of trades*.
Go and learn, by use and rule,
Skilful handling of each tool.'

We do not need to be told that there are very many implements, invented solely for woman's convenience, of which our girls have not heard, much less seen. I often think that we teachers are a slight contradiction to ourselves. We give collective lessons to our maidens on all sorts of subjects. We take their imaginations over the sea, and show them in foreign lands work that is done and tools that are used. We take a good deal of trouble to produce specimens or diagrams, or well-executed illustrations. But we do not think of doing this for the work to be done at home, and done by their own hands. Don't tell me that the children would not be interested in such matters. I would not give much for any teaching power that cannot make all and everything interesting to children—a dirty cloth or a lace veil, a tiny weed or the cedars of Lebanon, a grain of sand or a mass of rock, a spoon or a pestle and mortar, the tiniest midge in the animal creation or the elephant in his native woods.

Yes, we must have lessons on the tools. Our girls must learn the names and the use of everything requisite to make good work. If they know the right things to use and how to use them, they will be at least in a better position even to make shift than they would otherwise be.

But as far as possible we will contrive that this shall be rendered needless by our seeking to give them some possessions of their very own, which will aid any skill they may acquire.

Let me leave this matter to your thoughtful care for the well-being and well-doing of our girls. I have but made suggestions; if you follow them out, I have no fear as to the result. By your means and endeavours some of our lassies will soon have a better knowledge of *woman's tools*.

CHAPTER VI.

THESE BODIES OF OURS.

In the Mundella code the course of study marked out in our subject differs very materially from the one which preceded it. Then, the three years' course was as under:—

I. The home—strength and support. Food and clothing.
II. The home—comfort and beauty. Cleanliness, warmth, ventilation.
III. The home—health and prosperity. Sickness and health, saving and spending.

Now, although all these subjects must be taken up under the fresh arrangement, the most important predominance is given to all that belongs to our eating and drinking. Instead of getting through food and something else in one year, we have now to carry our instructions into all three years, going into details, and diving into the why and because of everything.

I. Food, its composition and nutritive value. Clothing, and washing.
II. Food, its functions. The dwelling, warming, cleaning, ventilation.
III. Food, its preparation and culinary treatment. Rules for health, and the management of the sick-room.

There is really far more to do, although spending and saving is omitted. With no more straw in the matter of time, we have yet to turn out a larger number of bricks.

But every earnest teacher, whose aim is real and thorough work, will consider the alteration an improvement. We are just muddling a subject when we

do not go *to the root* at the commencement of the lessons. We all know, for our intellects have been cultivated, and our minds enlightened, what a difficult matter it is to undermine a prejudice: and we know also that there are no more obstinate prejudices in the human mind than those which concern our eating and drinking. And we Britons have very strong feelings on this point, which lead us into all sorts of mistakes and very lamentable extravagances. It takes more than one generation to alter what has become a hereditary conviction among us. It may be all very true, but I don't believe it is considered an extinguisher to the propounder of new theories. And certainly it does seem rather autocratic to expect that the likes and dislikes of the home will change and give way at our bidding from the schoolroom. We may tell our little maidens that beefsteak is an unnecessary extravagance, and that *fried* beefsteak is an indigestible abomination—we may prove to them, according to our own estimation at least, that lentils are more nutritive and far cheaper, but the only response that will result will probably be the thought, 'Much *she* knows about it.'

But acting out that grand principle of teaching, 'That an ounce of intelligence is worth a pound of mechanical work,' we are now asked to take the old-fashioned and far wiser plan, and '*to begin at the beginning.*'

1. The body has to depend upon food for all it needs for repair or replenishing. What does it need?

2. Food has to provide the material which is to build up the body in health. What foods contain such material?

So, you see, we are required first to analyse the body to discover the need, and then we must analyse the food to find the supply. This is what I have called beginning at the right end.

And if this should seem to present a new view of the subject to any of us, we must not forget it is no such thing to the best authorities. For many years the popular lectures given by so many of our medical men at the request of our health societies or sanitary associations have dwelt largely on this point. *They* have shown all along that if you wish to mend muscle, and bone, and sinew, and mend it well, you must first of all know of what materials such muscle is composed, and secondly, where such material is to be found. And we shall find our work prepared and made easy for us by the efforts of those who have in the way referred to laid this subject before the public mind.

Our first step, then, should be to make our children acquainted with the various parts of the human body. They must understand that we are a marvellous compound of many elements—that we are not just body, and nothing else. Their minds must be led to compare bones and nails, hair and flesh, skin and gristle, and they must understand fully that what will replenish one part will be useless to another part.

And I cannot see how this knowledge can be given without a few lessons in Physiology. Don't be alarmed: not many lessons will be necessary for the purpose, but just so much as will form a sound foundation on which after-lessons may be built. Our children must understand something of the way in which our food is appropriated by the body, or in our future lessons there will always be their ignorance on this point standing as a mountain of mist to enshroud what should be of the clearest and brightest.

I propose, therefore, next to take up just so much of the subject as will be necessary to show the way in which our food is changed into flesh and bones, etc.

I. Food in the mouth.
II. Food in the stomach.
III. Food in the intestines.
IV. Food in the blood.

(*To be continued.*)

Chemistry of the Non-Metallics.

By Edward Aveling, D.Sc. London.

[This series of articles, whilst dealing with the subjects required by the University of London for the Matriculation Examination and with those required at the Elementary Stage of the Inorganic Chemistry (Branch X.) Science and Art Department, is intended as a practical guide to the philosophical and systematic study of the non-metallics.]

Chapter X.

Nitrogen—νιτρον (nitron) = nitre; γενναω (gennao) = I form. One of the elements in nitre or saltpetre.

Symbol. Weight-number. Preparation.

A. N.
B. 14.
C. First Preparation. From air.

1. Experiment with phosphorus and air (v. s.)

2. The symbols cannot be very satisfactorily given, as air is a mixture. $2P + 25$ vols. of air $= P_2O_5 + 10N^2$

3. $62 + 360$ (nearly) $= 142 + 280$
25 vols. 2 vols. 20 vols.

Second Preparation. From ammonium nitrite.

1. Place a solution of this salt in a flask fitted with a cork and delivery tube. Heat the flask. When the solution is boiling, catch the gas that comes off over water in the pneumatic trough. Only steam is formed at the same time.

2. $H^4NNO^2 = H^2O + N^2$
$64 = 36 + 28$
4 vols. 2 vols.

Third Preparation. From air by aid of iron and sal ammoniac.

1. Moisten some iron filings with a solution of sal ammoniac, and place them in a bell-jar over water for some time. The iron takes up the oxygen of the air, forming rust, or the magnetic oxide, or ferroso-ferric oxide, of iron, and nitrogen is set free.

2. $3Fe + 20$ vols. air $= Fe_3O_4 + 8N^2$
$168 + 288$ (nearly) $= 232 + 224$
20 vols. 16 vols.

Fourth Preparation. From air, ammonia, and copper.

1. A mixture of air and ammonia gas is passed over red-hot copper in the apparatus shown in Fig. 28. The copper takes up

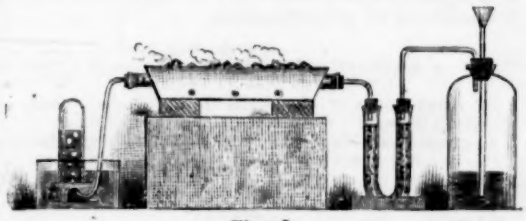


Fig. 28.

the oxygen of the air, forming copper oxide, and the nitrogen passes on. The action of the ammonia is to decompose the copper oxide as it is formed, producing steam and the metal copper once again.

$$Cu + 5 \text{ vols. of air} = CuO + 2N^2$$
$$63 + 72 \qquad 79 + 56$$
$$4 \text{ vols.}$$

FIFTH PREPARATION. From ammonia and chlorine.

1. Fit up an apparatus, as in Fig. 29. In the first flask place

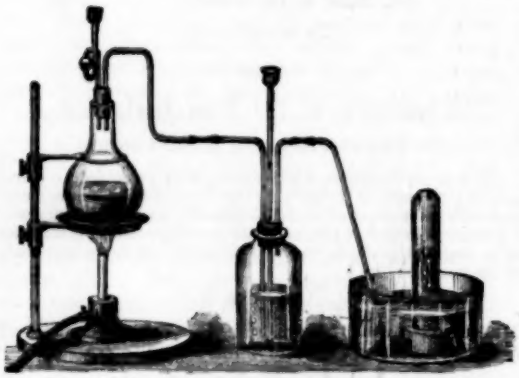


Fig. 29.

the materials for generating chlorine (see hereafter); and in the second a strong solution of ammonia. The greatest possible care must be taken always to have a large excess of ammonia present throughout the experiment, as otherwise the explosive nitrogen chloride is formed. The chlorine unites with the hydrogen of the ammonia to form hydrogen chloride (hydrochloric acid), and the nitrogen of the ammonia passes on to be caught over water. The acid that is formed in the second flask joins with the untouched ammonia to form ammonium chloride.

2. $2H^3N + 3Cl_2 = 6HCl + N^2 \ldots HCl + H^3N = H^4NCl.$

3. $34 + 213 = 219 + 28 \ldots 36\frac{1}{2} + 17 = 53\frac{1}{2}$
4 vols. 6 vols. 2 vols.

D. PROPERTIES. (1) A gas: very difficult to liquefy.

(2) Without taste, odour, colour. Transparent.

(3) 14 or $\frac{14}{14{\cdot}47}$.

(4) 100 cc. of water dissolve 1·5 cc. nitrogen.

(5) Not combustible and not a supporter of combustion.

(6) Its inertness is very noticeable. On the other hand, the compounds into which it enters, such as ammonia, nitric acid, nitro-glycerine, have very strongly-marked chemical properties. Nitrogen, therefore, and its compounds, serve as good illustrations of the great change in chemical nature that takes place when elements unite to form compounds.

E. MIXTURE. Air. The great mixture in which this gas exists has been described (see oxygen). If 4 vols. of nitrogen are mixed with 1 vol. of oxygen, the mixture has nearly all the properties of air.

EXERCISES ON NITROGEN (*solved*).

79. If 155 grams of phosphorus are burnt, what volume of nitrogen is formed? Temperature 10°, pressure normal.
If 62 grams P. are burnt, $20 \times 11{\cdot}2 = 224$ litres nitrogen formed.

" 1 gram " is " $\frac{224}{62}$ " " "
" 155 grams " are " $\frac{224 \times 155}{62}$ " " "
273 vols. at 0° become 283 vols. at 10°
1 vol. " " $\frac{283}{273}$ " "
$\frac{224 \times 155}{62}$ " " $\frac{283 \times 224 \times 155}{273 \times 62}$ " " $= 580\frac{4}{9}$.

80. What weight of ammonium nitrite must be decomposed that the combined volumes of steam and nitrogen given off at 104° may be 42 litres?

273 vols. at 0° become 377 vols. at 104°
377 " 104° " 273 " 0°
1 vol. " becomes $\frac{273}{377}$ " "
42 vols. " become $\frac{273 \times 42}{377}$ " "

$6 \times 11{\cdot}2 = 67{\cdot}2$ litres of the two gases are given off from 64 grams H^4NNO^2

1 litre " " is " $\frac{64}{67{\cdot}2}$ grams "
$\frac{273 \times 42}{377}$ " " are " $\frac{64 \times 273 \times 42}{67{\cdot}2 \times 377}$ " "
$= 28\frac{4}{11}$ grams

81. Some iron increases in weight 32 grams on the passage over it of air. Find the temperature at which the nitrogen formed comes off if its vol. is $98\frac{8}{15}$ litres.
When the increase of weight is

64 (*i.e.*, 232 − 168), $16 \times 11{\cdot}2$ litres of nitrogen are given off at 0°
1 $\frac{16 \times 11{\cdot}2}{64}$ " " " "
32 $\frac{16 \times 11{\cdot}2 \times 32}{64}$ " " " "
$= 11{\cdot}2 \times 8 = 89{\cdot}6 = 89\frac{3}{5}$

∴ increase of volume due to rise of temperature, is
$98\frac{8}{15} - 89\frac{3}{5} = 8\frac{8}{15}$

273 vols. increase for 1° rise of temperature 1 vol.
1 vol. " " " " $\frac{1}{273}$ "
$89\frac{3}{5}$ vols. " " " " $\frac{1}{273} \times 89\frac{3}{5}$
Increase of $\frac{1}{273} \times 89\frac{3}{5}$ for 1°
1 " $1 \div (\frac{1}{273} \times 89\frac{3}{5})$
$8\frac{8}{15}$ " $1 \div (\frac{1}{273} \times 89\frac{3}{5}) \times 8\frac{8}{15} = \underline{26°}$.

82. Air is passed over copper, and 7 grams of nitrogen are set free. What weight of copper oxide has been formed?

When 56 grams N are set free 79 grams CuO are formed.
1 gram " is " $\frac{79}{56}$ gram " is "
7 grams " are " $\frac{79 \times 7}{56} = \underline{9\frac{7}{8}}$

83. The sal-ammoniac resulting from the union of ammonia with the hydrochloric acid formed by the action of chlorine on ammonia weighs 214 grams. What volume of chlorine gas was used?—Temperature 13°. Pressure 741 mm.

$53\frac{1}{2}$ grams H^4NCl result when 11·2 litres Cl. are used.
1 gram " results " $11{\cdot}2 \div 53\frac{1}{2}$ "
214 grams " result " $11{\cdot}2 \div 53\frac{1}{2} \times 214$ "
273 vols. at 0° become 286 at 13°
1 vol. " becomes $286 \div 273$ "
$11{\cdot}2 \div 53\frac{1}{2} \times 214$ vols. " become $286 \div 273 \times 11{\cdot}2 \div 53\frac{1}{2} \times 214$
Under press. 760, vol. $= 286 \div 273 \times 11{\cdot}2 \div 53\frac{1}{2} \times 214$
1, vol. $=$ " " " " " $\times 760$
741, vol. $=$ " " " " " $\div 741$
$= \underline{48\frac{16}{117}}$ litres.

EXAMPLES ON NITROGEN (*for solution*).

73. Find the volume of oxygen necessary for the complete combustion of 93 grams of phosphorus. .....84 litres.

74. 70 grams nitrogen are needed. What weight of ammonium nitrite must be taken? .....160 grams.

75. A mixture of 28 grams of iron, and 21 grams of copper has air passed over it, until all of the metals is oxidised. What weight of oxygen has been taken up? .....16 grams.

76. What is the temperature when 100 litres of nitrogen are formed by the action of 136 grams of ammonia on chlorine?
$31\frac{1}{11}°$

(To be continued.)

Recent Inspection Questions.

[*The Editor respectfully solicits contributions—all of which will be regarded as* STRICTLY PRIVATE—*to this column. For obvious reasons, it cannot be stated in which district the questions have been set.*]

Arithmetic.

STANDARD II.

(1) Subtract 87,309 from one hundred thousand.
12,691. Ans.

(2) Multiply 689,407 by nine thousand and eighty.
6,259,815,560. Ans.

(3) Divide 59,674,143 by 9.
6,630,460 +3. Ans.

(4) In a regiment there are eight companies, each containing seventy-nine men, and besides these fifty-six bandsmen and twenty drummers. How many men are there in the whole regiment?
708 men. Ans.

STANDARD III.

(1) Divide 10,035,865 by 167, and write the answer in words. Sixty thousand and ninety-five. Ans.

(2) Add £987,648 12s. 11¾d.; £99 19s. 10½d.; £80,725 19s. 9d.; and £738 18s. 7½d.
£1,069,213 11s. 2¾d. Ans.

(3) Subtract £101 10s. 10½d. from one thousand pounds. £898 9s. 1½d. Ans.

(4) A lady who had five sovereigns, a half-sovereign, three half-crowns, and seven sixpences in her purse, spent £2 14s. 9½d. at the draper's, £1 19s. 6d. at the grocer's, and eighteen shillings and ninepence halfpenny at the baker's, how much had she left?
£0 7s. 11d. Ans.

STANDARD IV.

(1) What will be left from a thousand pounds after paying for 380 suits of clothes at £2 10s. 9½d. per suit? £34 19s. 2d. Ans.

(2) Find the weight in tons, cwts., etc., of 375 sacks of coal each weighing 280 lbs.
46 tons, 17 cwt., 2 qrs. Ans.

(3) Reduce 76,803 feet to miles, fur., poles.
14 miles, 4 fur., 14 poles, 4 yds. Ans.

(4) How many qrs., bushels, etc, are contained in 97,348 pints? 109 qrs., 1 bushel, 2 qts. Ans.

STANDARD V.

(1) Find by practice the value of 979 articles at £13 17s. 4½d. each. £13,577 10s. 1½d. Ans.

(2) What is the rent of an estate containing 39 acres, 3 roods, 12 perches at £7 10s. 0d. per acre?
£298 13s. 9d. Ans.

(3) If 1½ cwts. of potatoes cost a guinea, what is the value of a load of potatoes weighing 11 cwt., 1 qr., 20 lbs. £8. Ans.

(4) Make out a bill for 17 yds. calico at 9¾d. a yd., 25½ yds. linen at 2s. 7½d. a yd., 34¼ yds. flannel at 1s. 9d. a yd, and 14 pairs stockings at 2s. 4½d. a pair.
£8 13s. 11¼d. Ans.

(5) From $\frac{13}{10}$ subtract $\frac{1}{5} + \frac{2}{3} + \frac{5}{15}$. $\frac{1}{30}$. Ans.

STANDARD VI.

(1) Subtract $\frac{1}{2}$ of $\frac{5}{6}$ from $\frac{8}{9}$ of $\frac{7}{11}$, and multiply the result by $\frac{3}{7}$ of $\frac{5}{5}$. $\frac{5}{231}$. Ans.

(2) What part of $4\frac{3}{8}$ of £8 4s. 9½d. is $1\frac{5}{16}$ of £7 1s. 3d.? $\frac{9}{28}$. Ans.

(3) Divide $\frac{3.\dot{3}\dot{6}}{.8\dot{3}}$ by $\frac{8.\dot{2}}{2.\dot{0}3\dot{7}}$. 1. Ans.

(4) A man spends ·3125 of his wages in rent and clothing, and $\frac{5}{13}$ of the remainder on food, and then has 12s. 10d. left, what do his wages amount to?
£1 12s. 0d. Ans.

(5) If 4 travellers spend £21 12s. in 9 days, in how many days would 6 travellers spend £57 12s.?
16. Ans.

(6) Find the interest on £896 12s. 6d. for 2½ years at 4 per cent. per annum. £89 13s. 3d. Ans.

STANDARD VII.

(1) Express ·7 of 3s. 9d. + ·1$\dot{3}\frac{1}{2}$ of 6s. 2d. + ·26$\dot{3}$ of £3 15s. as the decimal of £9 8s. ·125. Ans.

(2) What is the ready money value of £598 9s. 9d. due in 1 year 115 days, at 2½ per cent.?
£579 8s. 9d. Ans.

(3) What amount invested in 5 per cent. stock at 96¼ will produce the same income as £2,120 invested in the 3 per cents. at 77? £1,590. Ans.

(4) I gained 15 per cent. by selling 185 bushels of oats for £53 3s. 9d.; what did the oats cost per bushel? 5s. Ans.

(5) In a school of 75 children, 66·6 per cent. are examined in geography, and of these 70 per cent. pass; how many children failed? 15. Ans.

(6) In a class of 20 boys, 8 are 10 years old, 5 are 9 years old, 3 are 8½ years old, and the rest 8 years old; what is the average age of the class?
9$\frac{1}{2}$ years. Ans.

Grammar.

STANDARDS V. TO VII.

(1) Explain what is meant by Superlative Degree. Give the positive and comparative of *best*, *least*, *worst*, *last*, *most*, and *furthest*.

(2) What is a relative pronoun? Decline the pronouns *he* and *who*.

(3) Is the verb *drop* regular or irregular? Explain why. Give the past tense and past participle of *go*, *run*, *break*, *cut*, *slip*, and *drink*.

STANDARD V.

(4) Analyse and parse:—
Remote from towns he ran his godly race.

STANDARD VI.

Analyse and parse the words in italics:—
Where are the *boys* of the Old *Brigade*,
That fought with us *side by side?*

STANDARD VII.

Analyse and parse:—
To *thine ownself be* true;
And it must follow, *as* the night the *day*,
Thou *canst* not *then be false* to any man.

How to Teach History.

BY ISABELLA LANDALE.

(Continued from page 225.)

Cultivation of the Judgment.

So far we have studied in the first place the means of making a vivid impression, by which the imagination is cultivated; secondly, the means of retaining these impressions, by which the pupil is trained to use his memory in the most rational way; and now, supposing the knowledge to be acquired and retained, we have to consider the use to be made of it in cultivating the judgment of the pupil. The last of these three is by far the most important aspect of history—although, except in rare instances, it receives very little attention from educators, who seem, as a rule, to expend their efforts in storing up knowledge in their pupils' minds, without teaching them how to use it. The students thus become mere intellectual misers, heaping up and never giving out. We may here borrow the axiom which Dr. Chalmers so happily applied to money, when we say that the whole value of historical knowledge lies in its use. This cannot be too strongly impressed on teachers.

As one great characteristic of judgment is the power of bringing our past experiences to bear on the present, by comparison with similar cases—our first attempts at cultivating the judgment must be made in the direction of strengthening the power of comparison in the pupils. This may be done, after they have acquired some knowledge of the subject, by asking them to illustrate certain points in history by similar incidents in the past or the present, thus proving the truth of the saying that, 'History repeats itself.' As, however, the power to select suitable examples requires a greater amount of judgment than is to be expected from most children, the teacher must at first give the examples himself, merely relating the fresh incident, and inducing the children by skilful questioning to find out the points of similarity for themselves. This is an exercise which will afford them the greatest delight; we have already alluded to the keen intellectual pleasure which metaphysicians call 'the flash of identity in diversity,' when recommending a simpler style of the same exercise for very young pupils, under the second head of this essay.

By the accumulation of similar instances the pupils will gradually acquire an insight into the workings of human nature which cannot fail to be of the greatest use to them in after life. The teacher should specially direct the attention of the children to his motives in multiplying these examples, that they may themselves try to use in daily life the knowledge they have acquired.

In the examples he cites, the teacher is not by any means to be confined to the history of the country which is being studied by the class, although the illustrations to be found in it should be quoted first, as being more familiar to the pupils. A fresh element of interest and power will be introduced by examples selected from the history of other countries, ancient as well as modern. The pupils will thus derive the benefits of a knowledge of universal history, without the labour of acquiring it.

Deliberate Cultivation of Common Sense (as the resultant of forgotten impressions.)

It is to be distinctly understood that it is not necessary for the pupil to remember the examples from the histories of other countries, for the sole objects of this exercise are to cultivate his powers of comparison, strengthen his judgment, and enlarge his knowledge of human nature. Though no steps are taken for retaining these examples permanently, care must be taken that they are sufficiently impressed at first to effect the ends for which they are introduced. But these ends will perhaps be better attained if the examples themselves are forgotten; for, as Carpenter says, 'Experience justifies the conclusion to which Science seems to point, that the habitually well-regulated mind forms its surest judgment by trusting to the automatic guidance of its common sense;'* and he quotes J. S. Mill on the same subject thus: 'A mind which is fitted by constitution and habits to receive truly and retain well the impressions made by passing experience will often be safer in relying on its intuitive judgments, representative of the aggregate of past experience, than in the inference that can be drawn from such facts or reasonings as can be distinctly called to mind at the moment.' † We can consciously retain only a limited number of facts, and those that we attempt to retain must have a distinct connection with others, besides being in themselves important (as we have tried to show when speaking of memory), but in cultivating the judgment with a view to its subsequent automatic action in the form of common sense, it is not the accumulation of historical facts that we must aim at; it is the resulting knowledge which these facts, in their passage through the mind, leave as permanent 'traces;' in short, it is the impression made by experiences which we wish the pupils to retain, not the experiences themselves. Another form of the same teaching might be illustrations by contrast, extremely interesting and valuable from the light they would throw on the results of different courses of conduct, but they would be much more difficult of application, so much so as to be almost beyond the reach of such a course. For it is a more abstruse study to trace similar circumstances resulting in totally different events, than it is simply to compare one incident with another like it, and yet where it can be done in a simple and effective manner it may be extremely useful. A third series of examples might be used to illustrate the uniformity of cause and effect, a study which would have great influence in developing foresight, or the application of past experience to the future.

Still another form of judgment receives some training in the study of history, *i.e.*, the weighing of evidence, but as that enters on the difficult ground of the reliability of history, and the occasional conflicting statements of historians, it must be reserved as suitable only for older students.

It may be objected that it would be impossible for ordinary teachers to attempt such a system of instruction, on account of the thought and labour involved in the selection of illustrative examples, which would require an amount of historical knowledge to be expected only from a professor of history. We at once admit that such demands on the teacher's time and attainments are not to be thought of. These examples would have to be provided for him in a teachers' manual connected with the text-book he is to use. We are not aware of the existence of any such

* Carpenter's 'Mental Physiology,' page 483.
† *Ibid*, page 486.

work, but it would be imperatively called for if this method met with general approval.

Testing Results.

Having considered the forming and fixing of impressions, and the use to be made of them, we must now glance at the best means of testing the results produced. For this purpose the teacher will doubtless make use of written examinations, at regular intervals. To these ordinary examinations, however, we would add one which may be looked upon as an innovation, but which seems a natural outcome of our system. We would have the first examination paper of every session set on the work of the previous year, and the answers given without any revisal, but solely from unassisted memory; we think this would be the best possible test for real work, and the best safeguard against cram. To insure the satisfactoriness of the test, it would be well to warn the parents of enthusiastic pupils not to permit any study during the holidays. If children work heartily while they are at school they should not be allowed to open a lesson book in the holidays. The only business to be done then is to lay in a stock of physical health and strength.

Such a paper set on the work of the last session should be the first work given to the pupils on returning to school; first, that they may revive the old before the new impressions of another session begin, and, secondly, because such an examination will efface the gap made by the holidays, and enable them to proceed securely from the firm ground of previous solid attainment.

If the imagination, memory, and judgment of the class have been cultivated as we might venture to expect by some years of such studies (the pupils now being eleven or twelve years of age), the style of instruction should be somewhat changed.

Standard of Attainment.

Before proceeding to consider the next form of teaching, however, it may be well here to remark that we have not given any indication of how much history we should expect a child to have acquired by the time he was eleven or twelve. In the standard of attainment for common schools, boys of eleven are expected to have acquired 'the outlines of the history of their own country,' a convenient vagueness of statement which is perhaps wiser than any attempt at a more minute definition of the required attainments. And yet, as mere outline knowledge of history has little or no value as mental discipline, it would be a pity if some teachers should be misled by this into confining their attention to outlines alone; though, as the history lesson in common schools is generally only part of the reading lesson, perhaps little more could be expected. As long as history is not taught separately, our method would be impracticable. The difficulty is to find time for a separate class, for nothing is so inexorable as time, and no secular knowledge is so valuable that we would be willing to risk health by prolonging the school hours for it. If such a thing were practicable, an hour in the day would be required to do full justice to our system. If this could not be spared from other important subjects, we might be content with three hours a week: an hour and a half of that we are already entitled to as part of the reading lesson, and the rest of the time might be abstracted from writing and geography; indeed, geography, as a rule, is much more favoured than history in most time-tables, and yet it can hardly be supposed to yield a greater, or even an equal mental discipline.

If so much time were granted, a good deal more than the outlines of English history might be expected; but the limits should not be too clearly marked, for it is not extent, but thoroughness of historical knowledge, and the mental discipline resulting from such thoroughness, that should form the aim in the school-teaching of history.

Besides this, the pupil will, of course, be familiar with some portions of sacred history, by means of the Bible lessons, and this will be a help to him when he begins ancient history, for, as has often been remarked, Bible history is closely connected with it in several directions, and no modern history can be understood without constant reference to the powerful and penetrating influence exerted by the events of sacred history on its whole domain.

(*To be continued.*)

—o—

University of London.

MATRICULATION EXAMINATION:

June, 1885.

(*Continued from page* 238.)

Greek.

Examiners { Dr. Schmitz, F.R.S.E. / Prof. A. S. Wilkins, LL.D., M.A.

II. Grammar.—(*Continued.*

3. Mention some adjectives which form the comparative in *-ίων* and the superlative in *-ιστος*, and state what forms of the comparative and superlative are used as adverbs.

4. Mention the first person singular of the future, the perfect, and the aorist active (first or second) of the following verbs:—*ἵημι, μέλλω, εὕδω, ἁμαρτάνω, τίνω, βαίνω, μανθάνω, λαμβάνω, φέρω, ὄμνυμι.*

5. What is the force of the particle *ἄν* when it belongs to a verb, and when it belongs to a relative pronoun or conjunction?

6. What is the difference in meaning between *ὁ ἀγαθὸς ἀνήρ* and *ὁ ἀνὴρ ἀγαθός*?

III. Passages for Translation from Books not Prescribed.

1. *Ἡ Φωκίωνος γυνὴ ἐρωτηθεῖσα, διὰ τί μόνη τῶν ἄλλων ἐν συνόδῳ οὐ φορεῖ χρυσοῦν κόσμον, ἔφη, ὅτι αὐτάρκης* (sufficient) *κόσμος μοί ἐστιν ἡ τοῦ ἀνδρὸς ἀρετή.*

2. *Ὁ Φαρνάβαζὸς ἐπεὶ εὖρε τε Ἄβυδον καὶ τὸν Σηστὸν οὕτως ἔχοντα, προηγόρευεν αὐτοῖς, ὡς, εἰ μὴ ἐκπέμψοιεν τοὺς Λακεδαιμονίους, πόλεμον ἐξοίσει πρὸς αὐτούς.*

3. *Ἅμα δὲ δὴ πεπραγμένων τούτων καταπλεῖ Λακεδαιμονίοις ἡ παρὰ Διονυσίου βοήθεια, τριήρεις πλέον ἢ εἴκοσιν· ἦγον δὲ Κελτοὺς καὶ Ἴβηρας καὶ ἱππεῖς ὡς πεντήκοντα· οἱ δὲ τῶν Ἀθηναίων ἱππεῖς οὐ μάλα ἐπλησίαζον τῷ στρατεύματι, ὁρῶντες ἰσχυρὰ καὶ πολλὰ τάντίπαλα.*

IV. History and Geography.

1. What period of Greek history is contained in the second book of the Hellenica?

2. Give a brief account of Theramenes.

3. When was the battle of Aegos Potamoi fought, and what were its results?

4. Give some account of the Athenian *βουλή* and *ἐκκλησία*.

5. How and by whom was Athens delivered from the tyranny of the Thirty?

6. Describe the sites of Chios, Ephesus, Lampsacus, Mytilene, Byzantium, Calchedon, Sellasia, Aegos Potamoi, Eleusis, Phyle.

English History and Modern Geography.

Examiners { Henry Craik, Esq., LL.D., M.A.
Prof. John W. Hales, M.A.

[N.B.—*Not more than* Ten *Questions are to be attempted, of which* Two *must be Questions in Geography.*]

History.

1. What permanent traces of Roman occupation have been left in our country?

2. State the limits of the kingdoms of Northumbria and Mercia at the time of their greatest power. By what steps did the kingdom of Wessex attain the supremacy amongst the Angle and Saxon states?

3. Describe the steps by which Christianity spread over England, and state the principal features of the Ecclesiastical organisation in the tenth century.

4. What illustrations can you give of the connection between England and the Continent before the year 900?

5. Contrast the position and power of the Crown in the Anglo-Saxon Constitution with that which it held in the early centuries after the Norman Conquest.

6. Give the principal features in the successive struggles between the Church and the Crown in the times of Lanfranc, Anselm, Becket, and Langton, respectively.

7. Describe the work of Montfort in regard to the constitution of Parliament.

8. Give the principal incidents in the struggle between England and France under Edward III.

9. What were the chief battles in the Wars of the Roses? and what were the chief political and social consequences of these wars?

10. State shortly what you know of Archbishop Morton; Thomas Cromwell, Earl of Essex; Lady Jane Grey; Archbishop Cranmer; Cardinal Pole; Lord Burleigh.

11. Describe, with dates, the chief events in the history of the Parliamentary struggle between the Petition of Right, in 1629, and the outbreak of the Civil War.

Geography.

12. Draw a map of India, marking the divisions between the Presidencies, and the principal towns and rivers

13. Describe the geographical lines followed by English colonial enterprise, and indicate the extent of the field which it has covered down to the present time.

14. At what times were the following gained for the British Crown:—The Channel Islands, Orkney, Gibraltar, Malta, and Jamaica?

15. Describe the situation of, and state the notable events connected with the following:—Tewkesbury, Dunbar, Prestonpans, the Boyne, St. Albans, Marston Moor, Torbay, Pevensey, Battle Abbey, Edgehill.

French.

Examiners { Rev. P. H. E. Brette, B.D.
Amedee Esclangon, Esq.

I. Translate into English *Two* (and not more than *Two*) of the following extracts:—

A.—*Jeunesse d'Alexandre.*

Alexandre naquit en 356 avant l'ère chrétienne. Son père venait de s'emparer d'une ville appelée Potidée et il reçut, au moment de la naissance de son fils, la nouvelle que l'un de ses généraux avait battu les Illyriens et que ses chevaux avaient remporté le prix de la course aux jeux Olympiques. C'étaient là d'heureux présages de la gloire réservée à son fils. . . . Alexandre fut placé sous la direction du grand philosophe Aristote à l'âge de treize ans. L'élève ressentit pour le maître la plus vive admiration. 'Il ne l'aimait pas moins,' disait-il, 'que son père.' Pendant quatre ans Alexandre étudia la poésie et l'éloquence, la morale et la politique, les sciences naturelles, la médecine et l'astronomie. . . . Les exercices physiques qui sont nécessaires pour entretenir la santé du corps et pour en développer la vigueur tinrent une grande place dans l'éducation d'Alexandre. Il fut excellent cavalier. 'Quel cheval va-t-on perdre là!' dit-il un jour en présence de Philippe, qui refusait d'acheter un fort bel animal que les écuyers n'avaient pu dompter. Son père lui reprocha de blâmer des gens d'expérience comme s'il avait été plus habile qu'eux. 'Je viendrais à bout de ce cheval,' dit Alexandre, 'mieux que personne.'—'Et si tu échoues,' dit Philippe, 'quelle sera la peine de ta présomption?'—'Eh bien, je payerai,' répliqua-t-il, 'le prix du cheval.' Alexandre maîtrisa l'animal sous les yeux de son père. Philippe en pleura de joie. 'Cherche un royaume qui soit digne de toi,' lui dit-il en l'embrassant; 'la Macédoine n'est pas à ta mesure.' Le cheval est resté célèbre sous le nom de Bucéphale ou 'tête de bœuf.' Alexandre en fit son coursier de guerre et plus tard il donna son nom à l'une des villes qu'il avait fondées.—*Van der Berg* (*Bibliothèque des écoles et des familles*).

B.—*Pépin le Bref et ses seigneurs de sa cour* (752).

Dans ces temps d'ignorance où la force brutale était seule appréciée, la stature exiguë de Pépin le Bref excitait les railleries des guerriers encore imbus des grossiers préjugés des anciens Francs. Le roi résolut de confondre ceux qui riaient à ses dépens. On avait dressé, à l'abbaye de Ferrières, une sorte de lice où luttèrent ensemble plusieurs bêtes féroces. Soudain, parurent sur l'arène un taureau indompté et un lion, qui combattirent avec un acharnement sans égal. Pépin, assis dans une tribune et entouré des seigneurs de sa cour, contemplait tranquillement ce combat. Déjà le lion saisissait le taureau par le cou, quand le roi dit à ses courtisans: 'S'il y avait un guerrier assez hardi pour séparer ces deux redoutables adversaires, ne serait-ce pas un grand acte de bravoure?'—'Certes, sire,' répondit un seigneur, 'ce serait plus que de la bravoure, ce serait de la témérité.' Un autre ajouta: 'Il n'y a pas au monde un mortel capable de tenter une pareille entreprise.'—'Quel est celui d'entre vous,' dit Pépin, 'qui osera sauter seul dans l'arène, pour arracher le lion de dessus le taureau?' A ces mots, tous les seigneurs baissèrent les yeux et personne ne répondit. Pépin le Bref, descend alors rapidement de l'estrade, s'élance dans le cirque et tirant son glaive, le plonge jusqu'à la garde dans la gorge du lion qui tombe mort à ses pieds, puis d'un revers, il abat la tête du taureau. Il promène alors fièrement ses regards sur ceux qui avaient paru jusqu'alors le mépriser, et leur dit: 'Apprenez que le courage ne se mesure pas à la taille: n'avez-vous jamais entendu dire que David, qui n'était pas plus grand que moi, a vaincu le géant Goliath? Vous semble-t-il maintenant que je puisse être votre roi?' Des cris d'admiration retentirent de tous côtés; ce fut la seule réponse des seigneurs confondus.—*C. Hygin-Furcy, Le La Fontaine en action.*

C.—*Louis XVI et le serrurier.*

Louis XVI avait de la simplicité, de la bonhomie même; mais il avait le sentiment de sa dignité à un degré assez intime lorsqu'il n'était pas à son enclume avec Gamin: il pouvait bien faire le Vulcain, mais il ne paraissait ainsi que devant un homme dont c'était d'ailleurs le métier d'avoir les mains noires; et voici un fait qui prouve que Louis XVI comprenait fort bien le danger d'un *ridicule royal*: Il était un matin plus activement occupé qu'à l'ordinaire, lorsque le serrurier qui travaillait avec lui, et qui s'appelait Jacques Derhin,* se mit à rire aux éclats en le regardant. Le roi lui demanda ce qui le mettait ainsi en joie. Derhin riait toujours et ne pouvait parler, mais il montrait à Louis XVI son propre visage, et lui indiquait par là ce qui excitait ainsi sa gaieté. Comme il n'y avait pas de glace dans la forge royale, le roi passa dans la pièce voisine: aussitôt qu'il se fut regardé, et qu'il put voir son visage tatoué d'une si étrange sorte qu'il en était méconnaissable, il partagea la gaieté de Jacques Derhin, et se mit à rire de ce bon rire franc et joyeux qu'on connaît peu sous une couronne. . . . Mais après avoir donné satisfaction à sa propre gaieté, le roi jugea ne pas devoir prolonger celle de son compagnon: 'Jacques,' lui dit-il, en lui donnant un louis d'or, 'tu boiras à ma santé ce soir à ton souper, avec ta femme et tes enfants, *mais sans leur raconter ce qui nous a tant fait rire; tu n'oublieras pas ce que je viens de te dire, mon garçon!*' Et il appuya sur ce dernier mot. Cette recommandation de Louis XVI prouve qu'il ne voulait par qu'on pût rire de lui; cette crainte du ridicule me plaît dans un roi.—*Duchesse d'Abrantès.*

II.—Grammatical Questions.

[*Not more than* Seven *of the following questions are to be answered.*]

1. Give the feminine substantives corresponding to *père, fils, maître, cheval, bœuf, roi, lion, seigneurs, homme, compagnon, garçon;* and put in the singular *ses généraux; c'étaient là d'heureux présages; les yeux.* Give the plural of *le cou.*

2. What is the feminine singular of *heureux, beau, habile, bref, grossiers, anciens, ceux, mortel, tous, bon, franc, dernier;* and

* Celui qui était avec le roi avant Gamin.

the masculine plural of *chrétienne, vive, naturelles, exiguë, féroces, pareilles, noires, royal?*

3. Form the comparative and superlative (*absolute* and *relative*) of *bon, petit, mauvais; bien, peu, mal;* and adverbs of manner from *heureux, grands, naturelles, excellent, habile, grossiers, anciens, égal, hardi, seul, franc.*

4. Write, in full, and in French, the dates:—356, 752, 1885; *Tuesday, the 16th of June.* When do *cent* and *vingt* take the sign of the plural? Illustrate your answer by examples. What is the meaning of *mille milles?*

5. What difference of meaning is there between *un homme grand* and *un grand homme; un vieux soldat* and *un ancien soldat; son propre visage* and *son visage propre?*

6. Give the 3rd pers. (*sing.* and *plur.*) of: (*a*) the Indicative present, (*b*) the Future, and (*c*) the Subjunctive (*present* and *imperfect*) of *naquit, venait, reçut, battu, tinrent, va, perdre pu, riaient, parut, assis, mort.*

7. Give the 1st pers. (*sing.* and *plur.*) of the Indicative present (*conjugated interrogatively*) of *étaient, ressentit, aimait, parut, avait, répondit, entendu, vaincu;* and conjugate *negatively* the Imperative of *placé, tinrent, dit, fit, plonge, mit, rire, boiras.*

8. Conjugate (*a*) the Indicative pluperfect of *s'emparer, s'élancer;* and (*b*) the Conditional past of *se regarder, se mettre.*

9. Give the participles (*present* and *past*) of *naqu ît, tinrent, va, viendrais, parut, répondit, abat, puisse, comprenait, mit, voir, rire, connaît, devoir, boiras, plaît.*

10. (*a*) Put in the singular '*Les exercices physiques qui sont nécessaires pour entretenir la santé du corps tinrent une grande place dans l'éducation d'Alexandre;*'—'*ceux qui avaient paru le mépriser;*'—'*des cris d'admiration retentirent.*'

(*b*) Put in the plural '*Si tu échoues, quelle sera la peine de ta présomption?—Eh bien, je payerai le prix du cheval;*'—'*il promena alors fièrement ses regards;*'—'*aussitôt qu'il se fut regardé et qu'il put voir son visage.*'

Natural Philosophy.

Examiners { Prof. G. Carey Foster, B.A., F.R.S.
Prof. A. W. Reinold, M.A., F.R.S.

[N.B.—*Only* Eight *questions are to be answered, of which at least* Two *must be selected from Section* A.]

A.

1. A picture weighing 40 lb. is hung, with its upper and lower edges horizontal, by a cord fastened to its two upper corners and passing over a nail so that the parts of the cord at the two sides of the nail make an angle of 60° with each other. Find the pull in the cord in pounds weight.

2. A piece of lead placed in one pan, *A*, of a balance is counterpoised by 100 grammes in the other pan *B*. When the same piece of lead is placed in the pan *B*, it requires 104 grammes in the pan *A* to balance it. Show what is the ratio of the lengths of the arms of the balance.

3. Explain what is meant in mechanics by a *couple*, and by the *moment of a couple*. If two men are working a capstan, what conditions must be fulfilled in order that their action on the capstan may be represented by a couple? How would you estimate the moment of the couple exerted by them?

4. Describe and sketch a system of pulleys on which (neglecting the weight of the pulleys) a *power* of 10½ lb. would balance a *weight* of 84 lb., and show how far the power must move in order to raise the weight 3 feet.

5. A boat is rowed on a river so that its speed in still water would be 6 miles an hour. If the river flows at the rate of four miles an hour, show how, by drawing a figure, to find the direction in which the head of the boat must be kept in order that its motion may be at right angles to the current.

6. A body starts from rest and moves with uniform acceleration 18 (feet, seconds): find the time required by it to traverse the *first, second,* and *third* foot respectively.

7. A cannon-ball is shot horizontally from the top of a tower 49 feet high, with a velocity of 200 feet per second. Find at what distance from the tower the cannon-ball will strike the ground.

B.

8. A piece of silver and a piece of gold are suspended from the two ends of an equal-armed balance beam, which is in equilibrium when the silver is immersed in alcohol (density=0·85), and the gold in nitric acid (density=1·5). The densities of the silver and gold being 10·5 and 19·3 respectively, what are their relative masses?

9. A piece of wood floats partly immersed in water, and oil is poured on the water until the wood is completely covered. Explain clearly whether this will make any change (and if so, whether there will be an increase or a decrease) in the portion of the wood below the surface of the water.

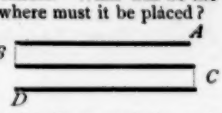
10. Give a clear explanation of the statement that the mercury in a barometer-tube is sustained by atmospheric pressure. What data would you require in order to calculate the height of a glycerine barometer when the pressure of the atmosphere is 15 pounds per square inch?

11. When a bright object is seen by reflection in a plate-glass mirror, several images are sometimes visible. Explain the formation of them. Which of them is generally the brightest, and why?

12. What is meant by saying that the refractive indices of glass and of water are 1·5 and 1·33 respectively? Show for which of these substances the *critical angle*, or *limiting angle of refraction*, is the greater.

13. An image of a candle-flame, 8 times as broad as the flame itself, is to be thrown, by means of a convex lens, on a wall at a distance of 12 feet from the candle. What will be the focal length of the lens required, and where must it be placed?

14. *BC* is a zinc rod riveted at *B* to an iron rod, *BA*, and at *C* to a second iron rod, *CD*. Show what must be the length of the rod *BC* relatively to the sum of the lengths of *AB* and *CD*, in order that the distance of the end-points, *A* and *D*, may not be affected by changes of temperature.



15. Explain the term 'Latent heat of water.' If the latent heat of water is represented by 80 when temperatures are measured on the Centigrade scale, what number will represent it when temperatures are measured on the Fahrenheit scale?

16. Describe experiments to prove, (1) that metals conduct heat better than wood; (2) that silver conducts better than tin; (3) that mercury conducts better than water.

Chemistry.

Examiners { Prof. J. Emerson Reynolds, M.D., F.R.S.
Prof. T. E. Thorpe, Ph.D., F.R.S.

1. Explain exactly what is implied by the formula C_2H_4.

2. What is the action of sulphuric acid on the following substances:—Limestone; copper; zinc; fluor-spar; and common salt? Represent the reactions by equations, and very briefly describe the chief properties of the products.

3. If 100 parts by *weight* of air contain 23 of oxygen and 77 of nitrogen, how many tons of air would be needed to burn one ton of coal consisting of—

Carbon	90·55
Hydrogen	4·14
Nitrogen	1·26
Oxygen	2·35
Ash	1·70
	100·00

Assume that, on burning, the carbon is wholly converted into carbon dioxide and the hydrogen into water; that the nitrogen is evolved as such, and that the ash is already fully oxidised.

4. Required one litre of sulphuretted hydrogen gas at 0°C. and 760 mm. pressure; calculate the weight of iron sulphide necessary for its production. Trace the chemical changes which take place when the gas is led into (*a*) aqueous solution of chlorine, and (*b*) solution of ammonia.

Fe = 56 S = 32.

5. How is the compound N_2O prepared? Explain the process and state the means you would adopt to determine its composition and molecular weight.

6. Specify the common sources of the elements chlorine, bromine, and iodine; explain with the aid of equations the methods adopted for their liberation, and state how you would distinguish between aqueous solutions of each of the free elements.

—o—

Penny Dinners for Children Attending Elementary Schools.—The new Vice-President of the Committee of Council on Education, the Right Hon. E. Stanhope, M.P., has joined the Central Council for promoting self-supporting penny dinners. Through the kindness of Sir Henry W. Peek, Bart., the Council are offering three prizes, of £40, £30, and £20, respectively, for the best three essays on the best means of dealing with the children who are ill-fed, and do not pay the penny for the dinners. Particulars of the competition may be obtained of the Hon. Sec., Mr. H. Forbes Clarke, Camden House, Hungerford Road, N.

Query Column.

RULES.

1. Each correspondent is restricted to *one question.* We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. ☞ When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher, Pilgrim Street, Ludgate Hill, London, E.C.*

Algebra.

1. S. Umwun.—Simplify :—

$$\frac{x^2-(y-z)^2}{(x+z)^2-y^2}+\frac{y^2-(z-x)^2}{(y+x)^2-z^2}+\frac{z^2-(x-y)^2}{(y+z)^2-x^2}.$$

(*Scholarship*, 1878.)

$$\frac{x^2-(y-z)^2}{(x+z)^2-y^2}+\frac{y^2-(z-x)^2}{(y+x)^2-z^2}+\frac{z^2-(x-y)^2}{(y+z)^2-x^2}$$

$$=\frac{(x+y-z)\,(x-y+z)}{(x+z+y)\,(x+z-y)}+\frac{(y+z-x)\,(y-z+x)}{(y+x+z)\,(y+x-z)}+\frac{(z+x-y)\,(z-x+y)}{(y+z+x)\,(y+z-x)}$$

$$=\frac{(x+y-z)\,(x+z-y)}{(x+y+z)\,(x+z-y)}+\frac{(y+z-x)\,(x+y-z)}{(x+y+z)\,(x+y-z)}+\frac{(x+z-y)\,(y+z-x)}{(x+y+z)\,(y+z-x)}$$

$$=\frac{x+y-z}{x+y+z}+\frac{y+z-x}{x+y+z}+\frac{x+z-y}{x+y+z}$$

$$=\frac{x+y-z+y+z-x+x+z-y}{x+y+z}$$

$$=\frac{x+y+z}{x+y+z}$$

$$=\underline{1}.$$ Ans.

2. Giglamps.—Solve :—

$$\sqrt{9+4x}=5-2\sqrt{x}.$$ (*Todhunter's* 'Algebra for Beginners.')

$$\sqrt{9+4x}=5-2\sqrt{x}$$
$$9+4x=25-20\sqrt{x}+4x$$
$$20\sqrt{x}=25-9$$
$$=16$$
$$5\sqrt{x}=4$$
$$25x=16$$
$$\therefore\quad x=\underline{\tfrac{16}{25}}.$$

3. Zeta.—Solve :—

$$(4a^2-9cd^2)x^2+(4a^2c^2+4abd^2)x+(ac^2+bd^2)^2=0.$$

(*Hamblin Smith.*)

$$(4a^2-9cd^2)x^2+(4a^2c^2+4abd^2)x+(ac^2+bd^2)^2=0$$
$$x^2+\frac{4a(ac^2+bd^2)}{4a^2-9cd^2}\,x=-\frac{(ac^2+bd^2)^2}{4a^2-9cd^2}$$
$$x^2+\frac{4a(ac^2+bd^2)}{4a^2-9cd^2}\,x+\left\{\frac{2a(ac^2+bd^2)}{4a^2-9cd^2}\right\}^2$$
$$=\frac{4a^2(ac^2+bd^2)^2}{(4a^2-9cd^2)^2}-\frac{(ac^2+bd^2)^2}{4a^2-9cd^2}$$
$$=\frac{4a^2(ac^2+bd^2)^2-(4a^2-9cd^2)\,(ac^2+bd^2)^2}{(4a^2-9cd^2)^2}$$
$$=\frac{9cd^2(ac^2+bd^2)^2}{(4a^2-9cd^2)^2}$$
$$x+\frac{2a(ac^2+bd^2)}{4a^2-9cd^2}=\frac{\pm 3d\sqrt{c}(ac^2+bd^2)}{4a^2-9cd^2}.$$
$$\therefore\quad x=\frac{(-2a\pm 3d\sqrt{c})\,(ac^2+bd^2)}{4a^2-9cd^2}$$
$$=\frac{-(2a\mp 3d\sqrt{c})\,(ac^2+bd^2)}{(2a+3d\sqrt{c})\,(2a-3d\sqrt{c})}$$
$$=-\frac{ac^2+bd^2}{2a+3d\sqrt{c},}\ \text{or}\ -\frac{ac^2+bd^2}{2a-3d\sqrt{c},}$$

Note.—Perhaps 70 per cent. It is rather too small.

4. Cyclops.—Solve :—

$$\left.\begin{aligned}x^3+y^3+z^3+3a^3&=0\\x+y+z&=0\\x^2y+b^3&=0\end{aligned}\right\}$$ (*Science and Art*, Stage III., 1885.)

$$\left.\begin{aligned}&(1)\ x^3+y^3+z^3+3a^3=0\\&(2)\qquad x+y+z=0\\&(3)\qquad x^2y+b^3=0\end{aligned}\right\}$$

$$(2)\quad (x+y+z)^3=0$$
$$x^3+y^3+z^3+3x^2y+3xy^2+3x^2z+6xyz+3y^2z+3xz^2+3yz^2=0$$
$$3a^3+3x^2y+3xy^2+3x^2z+6xyz+3y^2z+3xz^2+3yz^2=0$$
$$a^3+x^2y+xy^2+x^2z+2xyz+y^2z+xz^2+yz^2=0$$
$$xy(x+y+z)+xz(x+y+z)+y^2z+yz^2+a^3=0$$

But, $(x+y+z)=0$ (2)

$$\therefore\quad y^2z+yz^2+a^3=0$$
$$xyz+y^2z+yz^2+a^3=xyz$$
$$yz(x+y+z)+a^3=xyz$$
$$\therefore\quad \underline{a^3=xyz}\ (4).$$

$$\left.\begin{aligned}(3)\ y&=-\frac{b^3}{x^2}\\(4)\ y&=\frac{a^3}{xz}\end{aligned}\right\}$$

$$\therefore\quad \frac{a^3}{xz}=-\frac{b^3}{x^2}$$
$$\frac{a^3}{z}=-\frac{b^3}{x}$$
$$\therefore\quad \underline{z=-\frac{a^3x}{b^3}}.$$

$$(2)\quad x+y+z=0$$
$$x-\frac{b^3}{x^2}-\frac{a^3x}{b^3}=0$$
$$b^3x^3-b^6-a^3x^3=0$$
$$(b^3-a^3)x^3=b^6$$
$$x^3=\frac{b^6}{b^3-a^3}$$
$$\therefore\quad \underline{x=\frac{b^2}{\sqrt[3]{b^3-a^3}}}.$$

$$z=-\frac{a^3x}{b^3}$$
$$=-\frac{a^3}{b^3}\times\frac{b^2}{\sqrt[3]{b^3-a^3}}$$
$$=\underline{-\frac{a^3}{b\sqrt[3]{b^3-a^3}}}.$$

$$x+y+z=0$$
$$\frac{b^2}{\sqrt[3]{b^3-a^3}}+y-\frac{a^3}{b\sqrt[3]{b^3-a^3}}=0$$
$$y=\frac{a^3}{b\sqrt[3]{b^3-a^3}}-\frac{b^2}{\sqrt[3]{b^3-a^3}}$$
$$=\underline{\frac{a^3-b^3}{b\sqrt[3]{b^3-a^3}}}.$$

Arithmetic.

1. HEPTARCHY.—If I have a third as much again as my brother, how much less has my brother than I?

If 3 stand for my brother's share,
Then 4 stands for my share;
∴ My brother's share = $\frac{1}{4}$ less than my share.

2. G. T.—In what time will the compound interest on £3,125 at 4 per cent. amount to £390 4s.?

Amount of £1 at end of required time
= £1 + (£390·2 ÷ 3125)
= £1·124864.

Now amount of £1 for 1 year at 4 per cent. = £1·04, and if we raise 1·04 to a certain power until we obtain 1·124864, we shall obtain the number of years.

1·04
1·04
416
1040
1·0816
1·04
43264
108160
1·124864

$(1{\cdot}04)^3 = 1{\cdot}124864$;

∴ Required time = 3 years. Ans.

3. A CONFIDANT.—Two boats row over a straight course 1 mile 995 yards long, their rates of speed being 12 miles and $11\frac{33}{40}$ miles an hour respectively. Assuming that sound travels at the rate of 1140 feet a second, find how much the faster boat will be ahead of the other when the sound of the gun fired at starting is heard at the winning-post. (*Brook—Smith.*)

Time for sound of gun to reach winning-post

$$= \frac{1 \text{ mile } 995 \text{ yards}}{1140 \text{ feet}} \text{ sec.}$$
$$= \frac{3333}{1140} \text{ sec.}$$
$$= \frac{37}{4} \text{ sec.};$$

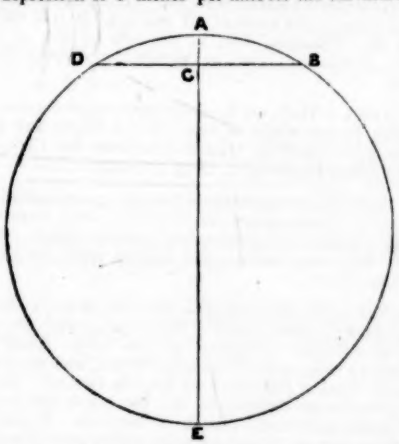
∴ Distance between the boats in this time

$$= (12 - 11\tfrac{33}{40}) \text{ miles} \times \frac{\frac{37}{4} \text{ sec.}}{1 \text{ hour}}$$
$$= \tfrac{7}{40} \text{ mile} \times \frac{29}{3600 \times 4}$$
$$= \frac{\cancel{7} \times \cancel{29} \times \cancel{11}}{\cancel{40} \times \cancel{3600} \times \cancel{4}} \text{ ft.}$$
$$= \tfrac{5}{4} \text{ ft.}$$
$$= 1\tfrac{1}{4} \text{ ft.} \quad \text{Ans.}$$

NOTE.—Perhaps 75 per cent. Writing is rather too small.

Mensuration.

1. FLANEUR.—In levelling for canals and railways engineers allow a depression of 8 inches per mile for the curvature of the earth. What is the earth's diameter, supposing this to be correct?

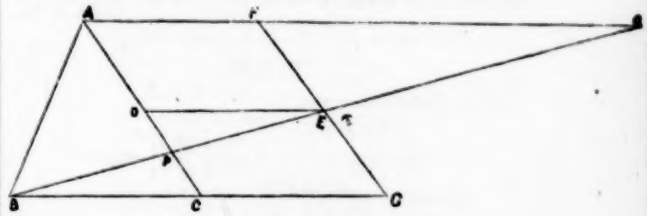


If the arc AB represent a mile on the earth's surface, the depth for canals and railways will be small compared with this distance, and we can take CB to represent the distance of a mile.

DC × CB = AC × CE; (III. 35.)
∴ 1 mile × 1 mile = 8 inches × remainder of diameter,
1 sq. mile = $\frac{1}{7920}$ mile × remainder of diameter;
∴ Remainder of diameter = 1 sq. mile ÷ $\frac{1}{7920}$ mile
= 7920 miles;
∴ Diameter = 7920 miles + 8 inches;
We might, therefore, say the diameter of the earth
= 7920 miles.

Geometry.

1. MISTY.—Draw a triangle ABC, and through A draw a line parallel to BC; show how to draw through B a line cutting AC at P, and the above-mentioned parallel in Q, so that BP shall be one-third of PQ. (*Science and Art*, 1883.)



Bisect AC in D (I. 10), and bisect DC in P.

Join BP, and produce it to meet the parallel line through A at Q.

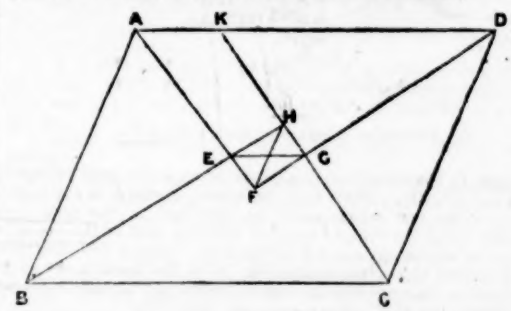
Then BP shall be one-third of PQ.

Through D draw a line parallel to BC (I. 31), cutting BQ in E, and through E draw FG parallel to AC, cutting AQ at F, and BC produced at G. (I. 31.)

Proof.—In the triangles BEG, QEF,
∠ BEG = ∠ QEF, (I. 15)
∠ BGE = ∠ QFE, (I. 29.)
And side EG = side EF, for EG = DC, and EF = DA; (I. 34.)
∴ Side BE = side QE; (I. 26.)
Wherefore BQ is bisected in E.
Similarly it can be proved that BE is bisected in P;
∴ BQ = 4 times BP;
Wherefore BP = $\frac{1}{3}$ of PQ.

Q. E. D.

2. DIO.—The lines, which bisect the angles of any parallelogram, form a rectangular parallelogram, whose diameters are parallel to the sides of the former. (*Isbister's* 'Euclid.')



Let ABCD be a parallelogram, and let the lines bisecting the angles form the quadrilateral EFGH.

Then EFGH shall be a rectangular parallelogram, and its diagonals EG, FH shall be parallel to the sides of the parallelogram ABCD.

Proof.—The angles BAD, ADC are together equal to 2 right angles (I. 29.)
∴ Angles FAD, FDA are together equal to a right angle;
Wherefore angle AFD is a right angle; (I. 32.)
Similarly it can be proved that angle BHC is a right angle

Also that angles AEB, CGD are right angles, and angle FEH = angle AEB, and angle FGH = angle CGD. (I. 15.)

∴ EFGH is a rectangular parallelogram.

Produce CH to meet AD in K.

In the triangles AEB, CGD,

$\angle BAE = \angle DCG$,

$\angle ABE = \angle CDG$,

and side AB = side CD; (I. 34.)

∴ side AE = side CG. (I. 26.)

Again, in the triangles DGK, DGC,

$\angle DGK = \angle DGC$, (Ax. 11.)

$\angle GDK = \angle GDC$, (Hyp.)

and side DG is common to the two triangles,

∴ side GK = side GC. (I. 26.)

Wherefore KG = AE, (Ax. 1.) and they are parallel,

∴ AK, EG are parallel (I. 33.)

Wherefore the diagonal EG is parallel to AD, and also to BC. (I. 30.)

Similarly it can be proved that the diagonal FH is parallel to AB and DC.

∴ The diagonals of the parallelogram EFGH are parallel to the sides of the parallelogram ABCD.

Q. E. D.

General.

1. 1ST B.A.—Prove that

$$\text{Tan}(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}.$$

(*Intermediate Arts, London*, July, 1884.)

$$\text{Tan}(A+B) = \frac{\sin(A+B)}{\cos(A+B)}$$

$$= \frac{\sin A \cos B + \sin B \cos A}{\cos A \cos B - \sin A \sin B}$$

(Dividing numerator and denominator by cos A cos B.)

$$= \frac{\frac{\sin A}{\cos A} + \frac{\sin B}{\cos B}}{1 - \frac{\sin A}{\cos A} \cdot \frac{\sin B}{\cos B}}$$

$$= \underline{\frac{\tan A + \tan B}{1 - \tan A \tan B}}.$$

2 INDOCTUS.—The solution of your query appeared in our issue for December, 1884.

3. J. H. SLADDIN.—Three equal rods are joined at a point, making equal angles with one another, and a weight of $4\sqrt{3}$ lbs. hangs from their point of intersection; find the pressure transmitted through each rod. (*Magnus's* 'Mechanics.')

The resultant of two equal pressures, the directions of which include an angle of 120°, is equal to either of the pressures, and bisects the angle between them.

If R stand for the resultant of the three pressures, and P for the pressure on each post,

Then, $R^2 = P^2 + P^2 + 2P.P \cos 60°$

$= 2P^2 + (2P^2 \times \frac{1}{2})$

$= 3P^2$,

$R = P\sqrt{3}$;

$\therefore 4\sqrt{3}$ lbs. $= P\sqrt{3}$,

$\therefore P = \underline{4 \text{ lbs.}}$

Wherefore pressure on each rod = 4 lbs.

4. F. FIRTH.—A body is projected up an inclined plane with given velocity. Show that the space described in any time is equal to that which would be described in the same time with a uniform velocity equal to half the sum of the velocities at the beginning and end of the time. Hence find the space described on a plane inclined at 30° to the horizon, while the velocity changes from 48 feet to 16 feet per second. (*Prelim. Scient., 1st M.B.*, 1872.)

Let f be the acceleration, u the initial velocity, v the velocity at the end of the time t, and s the space described; then

$$v = u - ft \quad \ldots\ldots(1)$$

$$s = ut - \tfrac{1}{2}ft^2 \quad \ldots(2)$$

$$(2)\quad s = ut - \tfrac{1}{2}ft^2$$

$$= \frac{2ut - ft^2}{2}$$

$$= \frac{2u - ft}{2}t$$

$$= \frac{u + (u - ft)}{2}t$$

$$= \underline{\frac{u+v}{2}t}.$$

∴ Space described in any time is equal to that which would be described in the same time with a uniform velocity equal to half the sum of the velocities at the beginning and end of the time.

In this case $f = g \sin 30°$

$= 32 \text{ ft.} \times \frac{1}{2}$

$= \underline{16 \text{ ft.}}$

$$(1)\quad v = u - ft$$

$$16 = 48 - 16t$$

$$16t = 48 - 16$$

$$= 32$$

$$\therefore \underline{t = 2}.$$

$$\therefore \text{Space} = \left(\frac{48+16}{2} \times 2\right)\text{ft.}$$

$$= \underline{64 \text{ ft.}} \quad \text{Ans.}$$

5. DE SANTRAILLES.—The following equation is obtained from your query:—

$$\underline{y^5 - y^4(a^2 - 3a) + y^3(3a^2 + 2ab) = a^3 - b^3}.$$

6. E. ROSE.—Who told you they would be discontinued? Wait, and you will see them. (1) Yes; but it will be better to supplement them. (2) French is easier and more useful. (3) No; we think not; nor does Huxley's book cover the course. (4) No, we have not seen it. (5) No; see advertisement. (6) No. (7) There are many good books. Try *Macmillan's* 'Progressive Course,' *Cassell's*, or *Smith's*. (8) You know the standard manuals for book work. For problems see 'Catch-Questions in Arithmetic and Mensuration,' by *Capel*; it contains the most complete set of useful questions yet published, together with aids for solving them.

If the sum of the sides of a triangle be 24 ft., and the area 24 sq. ft., and one of the sides is 8 ft., find the other sides.

Let a b and c be the sides. Then $\frac{a+b+c}{2} = 12 = s$, and let $c = 8$

then $a + b = 16$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)} = 24$$

$$\therefore \sqrt{12(12-a)(12-b)4} = 24$$

$$\therefore \quad 48(12-a)(12-b) = 24 \times 2 \times 12$$

$$\therefore \quad (12-a)(12-b) = 12$$

$$\therefore \quad 144 - 12(a+b) + ab = 12$$

$$\therefore \quad 144 - 12 \times 16 + ab = 12$$

$$\therefore ab = 60$$

But $a + b = 16 \quad \therefore (a+b)^2 - 4ab = 256 - 240$

$$\therefore (a-b)^2 = 16$$

$$\therefore a - b = 4$$

And $a + b = 16$

$$\therefore \quad a = \frac{16+4}{2} = 10$$

$$\text{And } b = \frac{16-4}{2} = 6$$

7. GWYLYM PYWELL.—Get the 'Principia,' Part II., and use it as directed in the preface. If you read it half through, and finish the 'Principia,' Part I., you will be able to do a good paper. If you have time, go through *Dr. Abbott's* 'Via Latina,' 3s. 6d.

8. XEMA.—There are so many excellent books that one does not like to say which is best. But a cheap and good set of tables is published by Messrs. Chambers and Co. You could not do wrong in getting it, using it at once.

9. WILLIAM STRATFORD.—The science examinations which are held at Christmas are only for those who have attended a course of science instruction in a training college. You can sit at the May examinations, and receive marks for any successes you may obtain.

10. ANXIOUS ASSISTANT.—*Barnard Smith's* or *Colenso's* 'Arithmetic,' and *Capel's* 'Catch-Questions' for problems; *Smith's* 'English Grammar,' or the *Rev. Evan Daniel's*; *Mackay's* 'Geography,' 'Student's Hume,' and some portions of *Green's* 'Smaller History of the English People.' The language you should learn depends on the use you intend to make of it. We should recommend French or German. If you think you will have occasion to read scientific books, learn German; if not, learn French.

11. Alphanso.—The small-hand is very good for the purpose you name; would be worth 80. The large-hand is not good; you must imitate some good copies. 50.

12. Pupil Teacher.—If you succeed in a drawing examination in May, 1886, you will get credit for it at the scholarship examination in 1886. It is not possible to get more than a definite number of marks for drawing. Dont try too many subjects. *Huxley's* and *Findlater's* 'Physiography,' and *Judd's* volume on 'Volcanoes,' in the International Series; 'A First Greek Reader,' by *W. G. Rushbrooke*, is in the Clarendon Press Series, and is published by Macmillan and Co.

13. Subscriber.—'Roman History,' by *Dr. Smith*; *Todhunter's* 'Algebra' and 'Euclid'; 'Solid Geometry,' by *J. M. Wilson* (Macmillan and Co.); 'Analytical Geometry,' by *Vyvyan* (Bell and Co.), or by *Todhunter*, or by *C. Smith* (Macmillan and Co.). For Latin grammar you will find *Dr. Smith's* 'Grammar' good. You can also use *Dr. Abbott's* 'Latin Prose through English Idiom.' Remember that you cannot teach yourself Latin composition successfully. Have your Latin and Greek and French thoroughly corrected. Your teacher will no doubt prefer to select the text-books. Read *Morley's* 'First Sketch of English Literature.' If you will name the authors you have to read, we will try to recommend you the best editions.

14. Subscriber.—You will find *Rushbrooke's* 'First Greek Reader' a most excellent manual. Go through it.

15. Excelsior.—Acting teachers take the second year's papers. There is no examination in practical skill at the Christmas examination.

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17. E. H.—We cannot say what subjects are taught in individual colleges. You can find out by writing to the secretary. In the recent examination, candidates were told to write the translation in English characters. The passage for translation into English was in German characters. No book is set for the examination. You can see the degree of proficiency that is expected by reading the questions set this July. They are printed for reference. We do not recommend any book in particular. You would find *Dr. Smith's* 'German Principia,' Parts I. and II., very well adapted to your purpose.

18. Ignoramus.—Always take pains when writing a letter. You put a superfluous *n* in 'containing,' and put no verb in what are meant to be three questions. Capital letters are used in wrong places, and full stops and articles omitted. *Chambers's* 'Etymological Dictionary' would perhaps suit you, or the more recent concise one by *W. W. Skeats* (Clarendon Press). Both are cheap. For perspective use *Yule's* book. For model there is nothing so likely to help you as the Lessons on Drawing now passing through the Practical Teacher. The syllabus can be bought for 6d., and obtained through any bookseller or direct from South Kensington.

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21. Zeta.—At present the large-hand would only get about 40. But there are indications that it might become a good hand with six months' practice. The small-hand is a little better, 60; but it is capable of great improvement.

Scholarship Questions.

July, 1885.

ADMISSION EXAMINATION, 1885.

MALE AND FEMALE CANDIDATES.

Grammar and Composition.

(*Two hours and a half allowed for this Paper.*)

(No abbreviation of less than three letters to be used in Parsing or Analysis.)

All candidates must do the Composition, Parsing, and Analysis.

Composition.

Write a letter, or an essay, on *one* of the following subjects:—

1. Your favourite flowers, and the way to cultivate them.
2. The moral lessons of the microscope and the telescope.
3. The advantages and disadvantages of town life as compared with life in the country.
4. Examinations.

Grammar.

1. Parse the words in italics in the following passage, not omitting to give and explain their *syntax*:—

> Breathes *there* a man with soul *so* dead
> Who never to himself *hath said*,
> This is my own, my native *land!*
> *Whose* heart hath ne'er within him burned
> As home his footsteps he hath turned
> From *wandering* in a foreign land?
> If such there *breathe*, *go*, mark him well;
> For him no minstrel raptures swell!
> High *though* his titles, proud his name,
> Boundless his *wealth*, *as* wish can claim,
> *Despite* those titles, power, and *pelf*,
> The wretch concentred *all* in self,
> Living, shall forfeit fair renown,
> And, doubly dying, shall *go* down
> To the vile dust from *whence* he *sprung*
> Unwept, unhonoured, and *unsung*.

2. Analyse either the first or the last half of the passage above into its component sentences, and show in separate columns:—

(*a*) The nature of the sentence.
(*b*) (If dependent) its relation to the principal sentence.
(*c*) Subject.
(*d*) Its enlargements (if any).
(*e*) Predicate.
(*f*) Its extensions (if any).
(*g*) Object (if any).
(*h*) Its enlargements (if any).

3. Explain by a paraphrase, or otherwise, the diction of the passage which you take for analysis.

4. Examine and illustrate the etymology of any five of the following words from the above:—

Own, native, whose, heart, foreign, minstrel, raptures, littes, boundless, claim, wretch, concentred, forfeit, renown.

5. Distinguish common, proper, and abstract Nouns—cardinal and ordinal Numbers—intransitive and neuter Verbs—continuative and disjunctive conjunctions—personal, possessive, reflective, and relative Pronouns.

6. It is often said that English is less of an *inflected* language in its later than in its earlier stages. Explain what is meant by this, and give a few instances of inflection, in English as now spoken.

7. Show by examples, how analysis helps us to parse correctly.

8. At which periods, and in connection with what events, in the history of this island did the most important changes take place in the language of the inhabitants? Illustrate your answer.

MALE AND FEMALE CANDIDATES.

Geography and History.

Three hours allowed for this Paper.

All candidates must draw a map, and answer question 8. They may answer *four* other questions in each of the two subjects.

Geography.

1. Draw an outline map (with meridians and parallels, if you can), noting thereon the physical features only, of

(*a*) Scotland;
or, (*b*) Spain and Portugal;
or, (*c*) New Zealand.

Also that angles AEB, CGD are right angles, and angle FEH = angle AEB, and angle FGH = angle CGD. (I. 15.)

∴ EFGH is a rectangular parallelogram.

Produce CH to meet AD in K.

In the triangles AEB, CGD,

∠ BAE = ∠ DCG,

∠ ABE = ∠ CDG,

and side AB = side CD; (I. 34.)

∴ side AE = side CG. (I. 26.)

Again, in the triangles DGK, DGC,

∠ DGK = ∠ DGC, (Ax. 11.)

∠ GDK = ∠ GDC, (Hyp.)

and side DG is common to the two triangles,

∴ side GK = side GC. (I. 26.)

Wherefore KG = AE, (Ax. 1.) and they are parallel,

∴ AK, EG are parallel (I. 33.)

Wherefore the diagonal EG is parallel to AD, and also to BC. (I. 30.)

Similarly it can be proved that the diagonal FH is parallel to AB and DC.

∴ The diagonals of the parallelogram EFGH are parallel to the sides of the parallelogram ABCD.

Q. E. D.

General.

1. 1ST B.A.—Prove that

$$\text{Tan}(A+B)=\frac{\tan A+\tan B}{1-\tan A\tan B}.$$

(*Intermediate Arts, London*, July, 1884.)

$$\text{Tan}(A+B)=\frac{\sin(A+B)}{\cos(A+B)}$$

$$=\frac{\sin A\cos B+\sin B\cos A}{\cos A\cos B-\sin A\sin B}$$

(Dividing numerator and denominator by cos A cos B.)

$$=\frac{\frac{\sin A}{\cos A}+\frac{\sin B}{\cos B}}{1-\frac{\sin A}{\cos A}\cdot\frac{\sin B}{\cos B}}$$

$$=\frac{\tan A+\tan B}{1-\tan A\tan B}$$

2 INDOCTUS.—The solution of your query appeared in our issue for December, 1884.

3. J. H. SLADDIN.—Three equal rods are joined at a point, making equal angles with one another, and a weight of $4\sqrt{3}$ lbs. hangs from their point of intersection; find the pressure transmitted through each rod. (*Magnus's* 'Mechanics.')

The resultant of two equal pressures, the directions of which include an angle of 120°, is equal to either of the pressures, and bisects the angle between them.

If R stand for the resultant of the three pressures, and P for the pressure on each post,

Then, $R^2=P^2+P^2+2P.P\cos 60°$

$=2P^2+(2P^2\times\frac{1}{2})$

$=3P^2$,

$R=P\sqrt{3}$;

$\therefore 4\sqrt{3}$ lbs. $=P\sqrt{3}$,

$\therefore P=\underline{4}$ lbs.

Wherefore pressure on each rod = 4 lbs.

4. F. FIRTH.—A body is projected up an inclined plane with given velocity. Show that the space described in any time is equal to that which would be described in the same time with a uniform velocity equal to half the sum of the velocities at the beginning and end of the time. Hence find the space described on a plane inclined at 30° to the horizon, while the velocity changes from 48 feet to 16 feet per second. (*Prelim. Scient., 1st M.B.*, 1872.)

Let f be the acceleration, u the initial velocity, v the velocity at the end of the time t, and s the space described; then

$$v=u-ft \quad \ldots\ldots(1)$$

$$s=ut-\tfrac{1}{2}ft^2 \quad \ldots(2)$$

(2) $s=ut-\frac{1}{2}ft^2$

$$=\frac{2ut-ft^2}{2}$$

$$=\frac{2u-ft}{2}t$$

$$=\frac{u+(u-ft)}{2}t$$

$$=\frac{u+v}{2}t.$$

∴ Space described in any time is equal to that which would be described in the same time with a uniform velocity equal to half the sum of the velocities at the beginning and end of the time.

In this case $f=g\sin 30°$

$=32$ ft. $\times\frac{1}{2}$

$=16$ ft.

(1) $v=u-ft$

$16=48-16t$

$16t=48-16$

$=32$

$\therefore t=2$.

$$\therefore \text{Space}=\left(\frac{48+16}{2}\times 2\right)\text{ft.}$$

$=64$ ft. Ans.

5. DE SANTRAILLES.—The following equation is obtained from your query:—

$$y^3-y^2(a^2-3a)+y^2(3a^2+2ab)=a^3-b^3.$$

6. E. ROSE.—Who told you they would be discontinued? Wait, and you will see them. (1) Yes; but it will be better to supplement them. (2) French is easier and more useful. (3) No; we think not; nor does Huxley's book cover the course. (4) No, we have not seen it. (5) No; see advertisement. (6) No. (7) There are many good books. Try *Macmillan's* 'Progressive Course,' *Cassell's*, or *Smith's*. (8) You know the standard manuals for book work. For problems see 'Catch-Questions in Arithmetic and Mensuration,' by *Capel*; it contains the most complete set of useful questions yet published, together with aids for solving them.

If the sum of the sides of a triangle be 24 ft., and the area 24 sq. ft., and one of the sides is 8 ft., find the other sides.

Let a b and c be the sides. Then $\frac{a+b+c}{2}=12=s$, and let $c=8$

then $a+b=16$

Area $=\sqrt{s(s-a)(s-b)(s-c)}=24$

$\therefore \sqrt{12(12-a)(12-b)4}=24$

$\therefore 48(12-a)(12-b)=24\times 2\times 12$

$\therefore (12-a)(12-b)=12$

$\therefore 144-12(a+b)+ab=12$

$\therefore 144-12\times 16+ab=12$

$\therefore ab=60$

But $a+b=16$ $\therefore (a+b)^2-4ab=256-240$

$\therefore (a-b)^2=16$

$\therefore a-b=4$

And $a+b=16$

$\therefore a=\frac{16+4}{2}=10$

And $b=\frac{16-4}{2}=6$

7. GWYLYM PYWELL.—Get the 'Principia,' Part II., and use it as directed in the preface. If you read it half through, and finish the 'Principia,' Part I., you will be able to do a good paper. If you have time, go through *Dr. Abbott's* 'Via Latina,' 3s. 6d.

8. XEMA.—There are so many excellent books that one does not like to say which is best. But a cheap and good set of tables is published by Messrs. Chambers and Co. You could not do wrong in getting it, using it at once.

9. WILLIAM STRATFORD.—The science examinations which are held at Christmas are only for those who have attended a course of science instruction in a training college. You can sit at the May examinations, and receive marks for any successes you may obtain.

10. ANXIOUS ASSISTANT.—*Barnard Smith's* or *Colenso's* 'Arithmetic,' and *Capel's* 'Catch-Questions' for problems; *Smith's* 'English Grammar,' or the *Rev. Evan Daniel's*; *Mackay's* 'Geography,' 'Student's Hume,' and some portions of *Green's* 'Smaller History of the English People.' The language you should learn depends on the use you intend to make of it. We should recommend French or German. If you think you will have occasion to read scientific books, learn German; if not, learn French.

11. ALPHANSO.—The small-hand is very good for the purpose you name; would be worth 80. The large-hand is not good; you must imitate some good copies. 50.

12. PUPIL TEACHER.—If you succeed in a drawing examination in May, 1886, you will get credit for it at the scholarship examination in 1886. It is not possible to get more than a definite number of marks for drawing. Dont try too many subjects. *Huxley's* and *Findlater's* 'Physiography,' and *Judd's* volume on 'Volcanoes,' in the International Series; 'A First Greek Reader,' by *W. G. Rushbrooke*, is in the Clarendon Press Series, and is published by Macmillan and Co.

13. SUBSCRIBER.—'Roman History,' by *Dr. Smith; Todhunter's* 'Algebra' and 'Euclid'; 'Solid Geometry,' by *J. M. Wilson* (Macmillan and Co.); 'Analytical Geometry,' by *Vyvyan* (Bell and Co.), or by *Todhunter*, or by *C. Smith* (Macmillan and Co.). For Latin grammar you will find *Dr. Smith's* 'Grammar' good. You can also use *Dr. Abbott's* 'Latin Prose through English Idiom.' Remember that you cannot teach yourself Latin composition successfully. Have your Latin and Greek and French thoroughly corrected. Your teacher will no doubt prefer to select the text-books. Read *Morley's* 'First Sketch of English Literature.' If you will name the authors you have to read, we will try to recommend you the best editions.

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—o—

Scholarship Questions.

July, 1885.

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Grammar and Composition.

(*Two hours and a half allowed for this Paper.*)

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MALE AND FEMALE CANDIDATES.

Geography and History.

Three hours allowed for this Paper.

All candidates must draw a map, and answer question 8. They may answer *four* other questions in each of the two subjects.

Geography.

1. Draw an outline map (with meridians and parallels, if you can), noting thereon the physical features only, of

(*a*) Scotland;
or, (*b*) Spain and Portugal;
or, (*c*) New Zealand.

2. Distinguish physical and political geography, and explain the terms:—degree of latitude, west longitude, tropic of Cancer, watershed, delta, and Gulf Stream. What changes have been recently determined upon by astronomers representing the leading nations of the world in the estimation of the longitude of a place, and of the time of day?

3. Describe a trip by steamer from London to Newcastle, or from Glasgow to Liverpool, with a sketch map of the coast line, noting any remarkable features of the coast.

4. Name the principal productions of six of the chief Colonies of Great Britain, and classify their climates as temperate, tropical, or otherwise.

5. Give brief explanations of the terms Sahara, Deccan, plateau of Tibet and Great Karroo.

6. State some of the routes which a person travelling to, and returning from New Zealand, might take, and give a full account of one of them.

7. Explain briefly the terms:—inferior planet, phases of the moon, perigee, morning star, neap tides, and draw diagrams illustrating the second and last.

History.

8. Arrange in chronological order, and give the dates of the following events:—The battles of Poitiers, Bannockburn, Pinkie, Marston Moor, Ashdown, and Evesham; the accession of Harold, George I., James II., and William Rufus; the passing of the Act of Catholic Relief; the transfer of the Government of India to the Crown; the South Sea Bubble; and the deaths of Wallace, Nelson, and Wolfe.

9. Explain the terms:—Statute of Praemunire, Petition of Right, Five Mile Act, Habeas Corpus Act, and give an account of the second and fourth of these measures.

10. Sketch briefly the character of Henry V., and give some account of his conquests in France.

11. What was the relationship of Mary I. to her husband, Philip of Spain; and of Mary Queen of Scots to her husband, Lord Darnley? Give genealogical tables in each case.

12. Detail briefly the chief events of British History in the years 1688-89.

13. Write a short account of the Seven Years' War, and recite the principal terms of the Peace of Paris.

14. Sketch briefly the career of the great Duke of Wellington.

15. Compare the state of the English labourer in the 16th and 19th centuries.

16. Give a comparative statement of the population of the United Kingdom in the reign of Queen Elizabeth, at the beginning of the present century, and at the present time. Detail some of the causes which have led to the rapid growth of population in the present century.

MALE AND FEMALE CANDIDATES.

Music.

Three hours allowed for this and the School Management Paper.

Candidates must keep *entirely* to one set of questions or the other. They are not permitted to answer more than four questions.

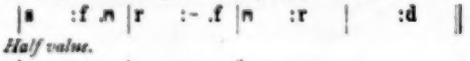
1. Write the pitch names (C, B, or *Do*, *Si*, &c.) and the duration names (Crotchet, Minim, &c.) of the following notes, and write the signs for rests of corresponding value:

Pitch names:

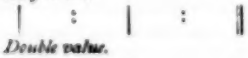
Duration names:

Rests:

1. *Re-write the following:*—(1) *halving the value of every note, and* (2) *again, doubling the value of every note and rest.*



Half value.

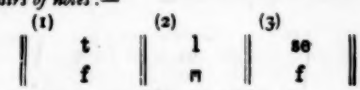


Double value.

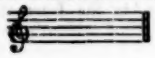
2. Describe the intervals (major third, &c.) formed by the following pairs of notes:—

2. *Describe the intervals* (*major third, &c.*) *formed by the following pairs of notes:*—

(1) (2) (3)



3. Write the signature of the scale of A major.



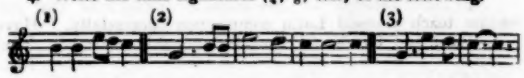
3. *Name* (1) *the strong tones and* (2) *the leaning tones of the common major scale.*

(1) *Strong tones:*

(2) *Leaning tones:*

4. Write the time-signatures ($\frac{3}{4}$, $\frac{6}{8}$, &c.) of the following.

(1) (2) (3)



4. *Write the signs for* (1) *three-pulse measure,* (2) *four-pulse measure,* (3) *six-pulse measure. The pulses need not be filled with notes. Make all the pulses equidistant.*

(1)

(2)

(3)

5. Write the ascending scale of C minor, using the minor sixth and the major seventh.

5. *Name* (1) *the major or sharpened sixth and* (2) *the minor seventh of the Lah or minor mode.*

(1) *Major sixth:*

(2) *Minor seventh:*

6. Explain (briefly) the following terms:—

(1) Dal Segno.

(2) Dolce.

(3) Diminuendo.

(4) Staccato.

6. *Explain* (*briefly*) *the following terms:*

(1) *Dal Segno.*

(2) *Dolce.*

(3) *Diminuendo.*

(4) *Staccato.*

MALE CANDIDATES.

Arithmetic.

Three hours allowed for this paper.

Candidates may not answer more than three of the sections under Question 1, and may answer eleven other questions.

The *solution* must be given at such length as to be intelligible to the Examiner, otherwise the answer will be considered of no value.

1. (*a*) Explain the statement that short division is a contracted form of long division.

(*b*) Define the terms:—least common multiple, and greatest common measure.

(*c*) In what sense can $\cdot 7$ be said to be equal to $\frac{1}{7}$?

(*d*) Give an example of inverse proportion, and explain the term 'inverse.'

(*e*) How would you explain the fact, that in division of decimals the quotient may be larger than the dividend? Give an example.

2. Find the sum of the four largest numbers, and four smallest that can be expressed by the figures 8259.

3. A man hires a cricket field for 90 days at 2 guineas a day, his expenses are 3s. 9d. per day; he charges 3d. admission per person, 6d. for horses, 1s. for carriages; he admits 10,070 persons, 3,000 horses, and makes on the whole £50; how many carriages has he admitted?

4. If 233 tons 15 cwt. 3 qrs. cost £15 17s., what will 314 tons 3 cwt. 2 qrs. cost?

5. A, B, and C have together £25. B has twice as much as A, and the difference between A's and C's shares is 16s. 4d.; find the share of each.

6. Show that $\frac{3}{5}$ of $\frac{7}{10}$ of $\frac{1}{3}$ of 3s. 4d. is greater than ·6 of ·07 of ·13 of 3s. 9d.

7. Each of two rooms is 18 feet wide, but one is twice as long as the other; the floor of the shorter room is covered with carpet at 9s. per yard, of the longer at 6s. per yard (the width of the carpet in each case being $\frac{3}{4}$ of a yard); find the length of each room in feet, when the difference in the cost of the two carpets is £6.

8. I change 50 lbs. of tea at 2s. 8d. per lb. for 170 lbs. of coffee; what must be the price of the coffee per lb. that I may gain 6½ per cent.?

9. Two pumps are employed to empty a full reservoir, holding 4,800,000 gallons. One pump throws 150, the other throws 350 gallons per minute. A stream discharges into the reservoir 20,000 gallons per hour. The first pump breaks down after working 18 days, how long will the second pump then take to empty the reservoir?

10. Two cubical tanks contain together 6,133,248 cubic feet, and the edge of one is twice as long as the edge of the other; find the edge of each.

11. A true discount of £99 0s. 11d. is allowed on a bill for £1,899 17s. 7d., due two years hence; at what rate per cent. simple interest is discount calculated?

12. If I sell goods at a loss of 6½ per cent. when I sell them for £18 15s., at what price must I sell them to make a gain of 6½ per cent.?

13. The percentages of actual to possible passes obtained at examination by the scholars of a public elementary school, in reading, writing, and arithmetic, were 95, 89, 87, respectively; the total number of passes was 813: find the number examined.

14. A can mow 3½ acres in 5 days, B 2½ in 4 days, C 7½ in 8 days; how long will they take, working together, to mow 359 acres? If the wages are £89 15s. what ought to be the share of each?

15. If I transfer £1,700 from the three per cents. at 98 to a 4 per cent. stock at 119 (neglecting brokerage in both cases), find my gain in income.

MALE AND FEMALE CANDIDATES.

School Management.

Three hours allowed for this Paper with that on Music.

All Candidates must answer question 1, and may not answer more than *eight* other questions.

1. Write full notes of a lesson on *one* of these subjects:—
   (1) Transitive and intransitive verbs.
   (2) The formation and course of rivers.
   (3) The parts of a house (for infants).

2. Describe the proper height and size of desks—(1) for an infant school, and (2) for a school of older children. Say how desks ought to be placed in reference to the light.

3. In teaching reading to very young children, some teachers begin with the alphabet; and others teach little words first, and afterwards call attention to the names of separate letters. Which of these methods do you prefer, and why?

4. Show how you would group or classify the letters of the alphabet for teaching the elements of writing to very young children. Explain by an illustration what use can be made of the system of *three-fold* ruling on slate or copybook.

5. What examples of figurative language occur in the following stanza, and how would you explain them to a higher class?—

> Ah! who can tell how hard it is to climb
> The steep where Fame's proud temple shines afar?
> Ah! who can tell how many a soul sublime
> Has felt the influence of malignant star,
> And waged with Fortune an eternal war—
> Checked by the scoff of Pride, by Envy's frown,
> And Poverty's unconquerable bar—
> In life's low vale remote has pined alone
> Then dropp'd into the grave, unpitied and unknown?

6. Give some examples of suitable exercises in Mental Arithmetic, adapted for scholars of the 1st and 5th Standards respectively.

7. If your school is supplied with (1) a globe; (2) a sun-dial; (3) a mariner's compass; (4) a thermometer; what use would you make of them?

8. Give some rules which you intend to follow for securing (1) distinct articulation; (2) intelligent expression in reading.

9. Name four or five poems, or poetical extracts, which you think suitable to be learned by heart, by scholars of the 3rd and of the 6th Standards respectively; and give your reasons for choosing them.

10. Describe the earliest lessons in drawing which should be given in an Infant School.

11. What sort of objects would you desire to collect in a School-Museum, and how would you classify them and use them?

12. Of all the different employments now used in Infant Schools, besides the learning of reading, writing, and arithmetic, which do you consider most useful and interesting, and why?

13. What sort of lessons do you understand to be intended by the 'phenomena of nature and of common life'? Make a list of 12 such lessons adapted for children in the 1st Standard.

14. Of the two methods of explaining Subtraction (1) Equal Additions; (2) Decomposition; which do you prefer, and why? Illustrate your answer by an example, fully worked out.

15. Make sentences showing how the same word is not always the some part of speech. Take as example the following words, and state in each sentence to what part of speech it belongs:—Long, near, but, that, rose, fly.

16. Say what use you think it right to make of 'tracing' in teaching writing. Write in large hand the five capital letters: B, K, Q, M, and W; and point out the commoner faults made by learners in forming them.

MALE AND FEMALE CANDIDATES.

Dictation and Penmanship.

(Twenty minutes allowed for these Exercises.)

Candidates are not to *paint* their letters in the *copy-setting exercises*, but to take care that the copy is clean and without erasures.

Omissions and erasures in the *Dictation Exercise* will be counted as mistakes.

The words must not be divided between two lines; there is plenty of room for the passage to be written.

Write in large hand, as a specimen of Penmanship, the word *Interrogation.*

Write in small hand, as a specimen of Penmanship—

Then burst from that great concourse
A shout that shook the towers.

Dictation.

Write the passage dictated to you by the Examiner, and punctuate it correctly.

(For the Examiner.)

The passage should be read *once* distinctly, and then dictated *once* in portions as marked.

If the room is large, and there is danger of your not being heard at its extremity, you may permit one of the officers of the College to stand half-way down the room, and repeat the words after you, exactly as you give them out.

It is essential that there be no complaint on the part of the Candidates that they could not hear or understand; you can only prevent this by clearness, accuracy, and audibility.

The migration of birds | is governed by certain intelligible laws, | but it varies | in many of its details, | even in the same species, | according to changed conditions. | It may be considered | as an exaggeration of a habit | common to all locomotive animals, | of moving about in search of food. | This habit is greatly restricted | in quadrupeds | by their inability to cross the sea, | or even to pass through | highly-cultivated valleys. | As they travel by night | at a considerable height, | their movements are difficult to observe, | and are supposed to be more mysterious | than they perhaps are. | In the tropics | birds move about to different districts | according as certain fruits ripen, | or certain insects become abundant. |

MALE CANDIDATES.

Euclid, Algebra, and Mensuration.

(Three hours allowed for this Paper.)

Candidates who attempt either of the questions in Mensuration must omit questions 5 and 6. (Marks are given for portions of questions.)

Euclid.

In the Euclid questions all generally understood abbreviations for *words* may be used, but no symbols of *operations* (such as $-$, $+$, $\times$) are admissible.

N.B.—Capital letters, not numbers, must be used in the diagrams.

1. From a given point to draw a straight line equal to a given straight line.

Draw the figure when the point is in the given line produced.

2. If a side of any triangle be produced, the exterior angle is equal to the two interior and opposite angles.

What is the size of the angle of a regular pentagon?

3. In any right-angled triangle the square which is described on the side subtending the right angle is equal to the squares described on the sides which contain the right angle.

State the converse of this proposition.

4. To divide a given straight line into two parts, so that the rectangle contained by the whole and one of the parts may be equal to the square on the other part.

5. If a straight line touch a circle, the straight line drawn from the centre to the point of contact shall be perpendicular to the line touching the circle.

Draw a straight line, parallel to a given straight line, which shall touch a given circle.

6. If a straight line touch a circle, and from the point of contact a straight line be drawn meeting the circle, the angles which this line makes with the line touching the circle shall be equal to the angles which are in the alternate segments of the circle.

Algebra.

7. Write down the factors of $x^4 - y^4$, $x^3 - 3x^2 + 3x - 1$, and $x^2 + 8x - 105$.

Find the value of $(a+b)^2 + (b+c)^2 + (c+a)^2$ when $a = -1$, $b = -2$, $c = 3$.

8. Reduce to lowest terms $\dfrac{x - 8x^2 + 15x^3}{x - x^2 - 20x^3}$ and

$$\frac{(a+b+c)^2 + (a-b)^2 + (b-c)^2 + (c-a)^2}{a^2 + b^2 + c^2}$$

9. Solve the equations—

$$(1)\quad \frac{2x+7}{5} - \frac{25-x}{2} = \frac{7x-5}{32} + 2.$$

$$(2)\quad \left.\begin{aligned} \frac{2}{x} + \frac{3}{y} &= 31 \\ \frac{5}{y} - \frac{7}{x} &= 31 \end{aligned}\right\}$$

10. Solve the equation—

$$\frac{2x}{51 - 2x} + \frac{68 - 3x}{x} = 3.$$

11. A train 200 yards long passes another train 240 yards long, moving in opposite directions on parallel lines, in 12 seconds; if they had been moving in the same direction they would have cleared each other in one minute; find the rate per hour of the two trains.

Mensuration.

12. The sum of the sides of a triangle is 24 feet; one side is 8 feet long, and the area of the triangle is 24 square feet; find the lengths of the two other sides.

13. Find the cost of painting a dog-kennel 5 feet long, 2 feet wide, each side being 2 feet high, and the perpendicular height of the ridge of the roof from the ground being $3\frac{1}{2}$ feet, at 3d. per square foot.

MALE AND FEMALE CANDIDATES.

Languages.

Two hours allowed for each Language.

Candidates examined in England, and *Female* Candidates in Scotland, may answer questions in *one* Language (*only*).

Male Candidates in *Scotland* may answer questions in *two* (not more) Languages.

Candidates in England must omit the last question in each language.

Latin.

N.B.—Male Candidates in Scotland, who wish to enter the Latin class at the University, *must* not omit any part of this section, but other Candidates *may* confine themselves to the parts marked with an asterisk.

1. Translate into English:—

*(*a*) Helvetii omnium rerum inopia adducti legatos de deditione ad eum miserunt. Qui cum eum in itinere convenissent seque ad pedes projecissent suppliciterque locuti flentes pacem petissent, atque eos in eo loco, quo tum essent, suum adventum exspectare jussisset, paruerunt. Eo postquam Cæsar pervenit, obsides, arma, servos, qui ad eos perfugissent, poposcit. Dum ea conquiruntur et conferuntur, nocte intermissa, circiter hominum millia VI. ejus pagi, qui Verbigenus appellatur, sive timore perterriti, ne armis traditis supplicio afficerentur, sive spe salutis inducti, quod in tanta multitudine dediticiorum suam fugam aut occultari, aut omnino ignorari posse existimarent, prima nocte e castris Helvetiorum egressi ad Rhenum finesque Germanorum contenderunt.

(*b*) Pugnatum est ab utrisque acriter. Nostri tamen, quod neque ordines servare neque firmiter insistere neque signa subsequi poterant, atque alius alia ex navi quibuscunque signis occurrerat se aggregabat, magnopere perturbabantur; hostes vero notis omnibus vadis, ubi ex litore aliquos singulares ex navi egredientes conspexerant, incitatis equis impeditos adoriebantur, plures paucos circumsistebant, alii ab latere aperto in universos tela conjiciebant.

*2. Conjugate and parse the following verbs:—*adducti*, *projecissent*, *paruerunt*, *poposcit*, *conquiruntur*, *afficerentur*, *egressi*.

*3. Give the rules for the government of *inopia*, *quo*, *nocte*, *Verbigenus*, *supplicio*, (prima) *nocte*.

4. Decline in the singular and plural *rupes*, *præceps*, and in the singular only *unusquisque*, *uterque*, and *jusjurandum*.

5. How does Latin supply the want of a future infinitive passive?

6. Translate into Latin:—

*(*a*) He sent his brother to collect an army.

*(*b*) All things are easy to him, who conquers by love.

(*c*) He heard that the general, with three hundred of his bravest soldiers, had been slain.

(*d*) As soon as he arrived, he announced that a battle had been fought on the banks of the river.

(*e*) I am not what I once was.

MALE AND FEMALE CANDIDATES.

Greek.

N.B.—Male Candidates in Scotland, who wish to enter the Greek class at the University, *must* not omit any part of this section, but other candidates *may* confine themselves to the parts marked with an asterisk.

1. Translate into English:—

*(*a*) ἐν τούτῳ δὲ ἐπῆει καὶ Κῦρος καὶ ἐπύθετο τὸ πρᾶγμα· εὐθὺς δ' ἔλαβε τὰ παλτὰ εἰς τὰς χεῖρας καὶ σὺν τοῖς παροῦσι τῶν πιστῶν ἦκεν ἐλαύνων εἰς τὸ μέσον, καὶ λέγει τάδε. Κλέαρχε καὶ Πρόξενε καὶ οἱ ἄλλοι οἱ παρόντες Ἕλληνες, οὐκ ἴστε ὅ, τι ποιεῖτε, εἰ γάρ τινα ἀλλήλοις μάχην, συνάψετε, νομίζετε ἐν τῇδε τῇ ἡμέρᾳ ἐμέ τε κατακεκόψεσθαι, καὶ ὑμᾶς οὐ πολὺ ἐμοῦ ὕστερον· κακῶς γὰρ τῶν ἡμετέρων ἐχόντων, πάντες οὗτοι οὓς ὁρᾶτε βάρβαροι πολεμιώτεροι ἡμῖν ἔσονται τῶν παρὰ βασιλεῖ ὄντων. ἀκούσας ταῦτα ὁ Κλέαρχος ἐν ἑαυτῷ ἐγένετο· καὶ παυσάμενοι ἀμφότεροι κατὰ χώραν ἔθεντο τὰ ὅπλα.

(*b*) Ἀποθνήσκοντος γὰρ αὐτοῦ, πάντες οἱ περὶ αὐτὸν φίλοι καὶ συντράπεζοι ἀπέθανον μαχόμενοι ὑπὲρ Κύρου, πλὴν Ἀριαίου· οὗτος δὲ τεταγμένος ἐπύγχανεν ἐπὶ τῷ εὐωνύμῳ, τοῦ ἱππικοῦ ἄρχων· ὡς δ' ἤσθετο Κῦρον πεπτωκότα, ἔφυγεν ἔχων καὶ τὸ στράτευμα πᾶν οὗ ἡγεῖτο.

*2. Parse fully:—*ἐπῆει*, *παροῦσι*, *ἴστε*, *ὅ*, *τι*, *κατακεκόψεσθαι*, *πολεμιώτεροι*, *ἀκούσας*, *ἔθεντο*.

*3. Give the genitive and dative singular, and the dative plural of *σώφρων*, *σατράπης*, *ἄγγελος*, *ἀνήρ*, *στράτευμα*, *κόρις*, and *γυνή*.

4. Write down the comparative and superlative of the adjectives *πολύς*, *ῥᾴδιος*, *καλός*, *μέλας*, *μέγας*, and of the adverbs *ἄνω*, *κάτω*, *εὖ*, and *πρωΐ*.

5. Give the corresponding Greek for:—They are striking (*τύπτω*), we struck, he had struck, ye shall strike, I might be about to strike, to have struck, striking, about to strike, I was striking myself, I am on the point of being struck, having been struck.

6. Translate into Greek :—

*(*a*) My father gave me a beautiful book.

*(*b*) The Queen loved Cyrus better than his brother Artaxerxes.

(*c*) Wise men learn (*μανθάνω*) many things from enemies.

(*d*) The elder son happened to be present in Babylon.

(*e*) The general held a review of his soldiers in the Queen's park.

German.

(German words must be written in the English character.)

1. Translate into English—

Ein kranker Vater rief den Sohn;
„Sohn," ſprach er, „um dich zu verſorgen,
Hab' ich vor langer Zeit einſt einen Schatz verborgen,
Er liegt"—hier ſtarb der Vater ſchon.
Wer war beſtürzter als der Sohn?
Ein Schatz! ſo waren ſeine Worte,
Ein Schatz! allein an welchem Orte?
Wo find' ich ihn? Er ſchickt nach Leuten aus
Die Schätze ſollen graben können,
Durchbricht der Scheuren harte Tennen,
Durchgräbt den Garten und das Haus,
Und gräbt doch keinen Schatz heraus.
Nach viel vergeblichen Bemühn
Heißt er die Fremden wieder ziehn;
Sucht ſelber in dem Hauſe nach,
Durchſucht des Vaters Schlafgemach,
Und findt mit leichter Müh' (wie groß war ſein Vergnügen!)
Ihn unter einer Diele liegen.

C. F. Gellert.

2. Parse fully **dich, Zeit, wer, beſtürzter, als, Worte, die, ſollen, Schätze, können, Leuten, ihr.**

3. **Ein kranker Vater.** Write out these words in all the cases of the singular number; then substitute **der** for **ein**, and give the cases of both article and substantive in the singular and in the plural.

4. Point out the chief inversions of the natural order of the words in the passage from **Er ſchickt** to the end.

5. Translate into German :—

(*a*) Horses are very useful animals.

(*b*) The storm has ceased, and it is half-past twelve o'clock: let us go home.

(*c*) I have a tall son: your sons also are both tall.

(*d*) A sick man ought always to have full confidence in his doctor.

(*e*) I am now able to speak that difficult language, and to write it quite correctly and rapidly.

(*f*) Do you intend to stay here any time? I may stay some weeks or leave immediately: it depends upon circumstances.

(*g*) If the young teacher had believed the advice of his friend he would hardly have driven out to-day in the bad weather.

French.

1. Translate into English—

Le 14 Juin, à midi, la corvette *La Recherche*, appareillait dans le port du Havre pour entreprendre un voyage au Spitzburg. Le ciel était pur, la mer calme; une foule de spectateurs venaient de se ranger le long du quai, les uns pour satisfaire au sentiment de curiosité, d'autres pour nous [a] envoyer encore un dernier adieu. Debout sur le pont, nous [b] regardions tour-à-tour la terre de France, qui s'effaçait peu-à-peu derrière nous [c], l'espace immense qui se déroulait à nos yeux, et tour-à-tour notre pensée s'en allait du passé à l'avenir, des regrets d'affection aux désirs de voyage.—*X. Marmier.*

2. Parse fully the words: Le 14 Juin, du Havre, venaient, d'autres, nous [a], debout, nous [b], s'effaçait, nous [c], yeux, s'en allait, aux désirs.

3. Write out in full the imperfect tense indicative, and the conditional (present) of the verbs: être, prendre, savoir, finir, vouloir, tenir.

4. Supply to each of the following nouns an adjective agreeing with it in number and gender: année, travaux, parapluie, ardoises, chambre, eaux, faim, promenade.

5. Translate into French—

(*a*) Silence! I hear some one coming. Who goes there? (It is) I.

(*b*) My boots are broader than yours, but not so long.

(*c*) I know that you will afterwards repent it.

(*d*) Have you thanked him for what he has done for you?

(*e*) I have succeeded (réussir) better than I expected.

(*f*) The coachman all at once perceived that one of the wheels of the carriage was broken.

(*g*) Some one asked Diogenes (Diogène) at what o'clock he should dine. The philosopher answered him, 'If you are rich, when you please; if you are poor, when you can.'

—o—

Lessons in Latin.

BY THE REV. A. D. CAPEL, M.A., CANTAB.,

Formerly Examiner of Schools to Cambridge Local Examination Syndicate.

(*Continued from page* 205.)

KEY TO EXERCISES.

EXERCISE 54.

A.

WE are carrying war into Italy, about (intending) to fight so much more boldly than (our) enemies, as the soul of (one) carrying force in (attacking) is greater than that of him warding (it) off. Moreover, grief, injury, indignity, (each) enkindle and stir up the mind. They have earnestly demanded me first, as (your) leader, for punishment, then all of you, (whom) given up, they would have visited with the greatest tortures. A most cruel and proud race, subjects (lit. does) all things to its (as of possession) own judgment; it limits and shuts us in with the boundaries of mountains and rivers, and does not observe those boundaries which it has laid down. They have sent the two consuls of this year, the one to Africa, the other to Spain. Nothing has ever been left to us, except what we may have rescued with our arms. It is allowed those to be timid and slothful whom their own land will receive, when flying through safe routes; for you it is necessary to be brave men, and either to conquer, or to meet death in battle rather than in flight. If this is well fixed in your mind, again I will say you have conquered; for no weapon has been given to man by the immortal gods sharper for conquering than contempt of death.

B.

1. To these things Cæsar answered, but the end of his speech was (as follows):—'That he could have (lit., to be to him) no friendship with these if they remained in Gaul; nor was it true that those who could not defend their own territories would occupy those of another; nor were there any lands lying idle (this word is wrongly translated in vocabulary) in Gaul which could be given without injury to so especially great a multitude. But that it would be lawful, if they wish, to settle down in the territories of the Ubii, whose legates are with them, both to complain concerning the injuries of (*i.e.*, done by) the Suevi, and to ask help from them; that he would obtain this from them.'

2. Ad hæc Cæsar respondit, sed exitus fuit orationis: 'Mihi nulla cum his amicitia esse potest, si in Gallia remanetis; neque verum est (eos) qui suos fines tueri non potuerunt, alienos occupare; neque ulli in Gallia vacant agri, qui dari tantæ præsertim multitudini sine injuria possunt. Sed licet, si vultis, in Ubiorum finibus considere, quorum sunt legati apud vos et de Suevorum injuriis querantur, et a se auxilium petant: hoc ab iis impetrabitis.'

Exercise 55.

A.

1. Will he not order this man to be slain with the greatest punishment (*i.e.*, in the most ignominious and painful way)? 2. Art thou that Æneas? 3. Is any one angry with you? [No.] 4. What, the boy Ascanius, does he live and feed on the air? 5. With what lies have the meanest men laden you? 6. Are these cinders less, comparatively, high than the whole world? 7. And Remus being ignorant of this, began to despise the humble walls, and to say, 'Will the people be safe with these?' 8. Did not Dionysius the tyrant, having been expelled from Syracuse, teach boys at Corinth? 9. A she-wolf with young, marvellous to say, came to the twins that had been exposed. Who can believe that the beast did not hurt the boys? 10. Can I ('tell' understood), since I am ignorant, how good a man he is? [No.]

B.

1. Quis te mihi casus ademit? 2. Quid voveat dulci nutricula majus alumno? 3. Unde tibi, quæ te sic amet, uxor erit? 4. Quis non causas mille doloris habet? 5. Quid lacerat Danaas impiger Hector opes? 6. Nonne hæ literæ recitatæ magnum luctum fecerunt? 7. Num speras tibi id laudi futurum esse, quod mihi vitio vertis? 8. Num beate vivendi cupiditate omnes incensi sumus? 9. Nonne Epaminondas studiosus erat audiendi? 10. Unquamne periculum sine periculo vincitur?

Exercise 56.

A.

1. For the good, what is well done does not perish. 2. Men indeed perish, but humanity itself, for which man is formed, remains. 3. Patience ought to be sought, because it cannot be obtained by favour. 4. Do you say, 'Can you not know that in any other way?' By no means 5. 'Go, my bird,' said he; 'let nothing delay the pious sacrifice, and bring the stagnant water to the living (flowing) fountains. 6. She was going, sprinkled as to her shoulders with her perfumed hair. 7. When the very sad image of that night approaches, which was to me the last time in the city. 8. I was able to do without his commands, nor (was I able) to trust. 9. The ignorance of coming age (Eng., time) must be ruled by the prudence of old men. 10. We have been so furnished by nature that every day (matters) though they are worthy of admiration, pass (us) by; on the other hand, the sight of even very little things may become sweet, if they have appeared unexpected.

B.

1. Multa experiendo facilia fient, quæ segnibus ardua videntur. 2. Multi transeunt vitam, dum vitæ instrumenta quærunt. 3. Vis fieri dives? Nil cupiisse velis. 4. Brevis esse laboro, obscurus fio. 5. Arboribus redeunt detonsæ frigore frondes. 6. Sidera cernere fulgida sæpe nequimus. 7. Intereat tecum sic genus omne tuum. 8. Quin adeas vatem, precibusque oracula deposcas (or better, 'poscas'). 9. Mŏvit more lupi inclausas circumeuntis oves. 10. Quem secum patrios aiunt portare Penates. (Note the 'whom' of the English is not grammatical.)

Lesson LVII.

Verbs followed by a Dative.

459. In Lesson 50, we showed how compounds of 'Esse' were followed by the dative. In this lesson we are going to treat of other words that are followed by a dative, when we might, perhaps, expect an accusative. Some of these words have been included in former vocabularies, and the fact that they govern the dative has been there printed—as (Voc., 50), to hurt, 'nocere' (dative).

460. The compounds of verbs with prepositions, præ, ab, ad, con, sub, ante, post, ob, in, inter, re, are generally followed by the dative case, when, if the preposition were separated from a verb we should find an accusative or ablative—as, 'Dona imposuit aris'; 'He placed gifts on the altars'; the 'aris' being dative, and not ablative, as it might be etymologically.

461. If the preposition be repeated, the ablative or accusative is used, as if the preposition had not been found in the compound verb—as, 'Conferte hanc pacem cum illo bello'; 'Compare this peace with that war.'

462. Some intransitive verbs become transitive by being compounded with a preposition, and when this is the case such verbs govern the accusative like any other transitive verbs—as, 'Invadunt urbem'; 'They enter the city.'

463. The compounds of the adverbs, bene, satis, and male govern the dative case, even if the elements of the words are separated by another word—as, 'Di tibi beneficiant'; 'May the gods bless you.'

464. Besides the above, the first verbs of the vocabulary govern a dative case, and should be committed to memory; but, as has been pointed out in an earlier vocabulary, if the verb is resolved into its constituent parts, it will be seen that the word put in the dative is really an indirect object rather than a direct one— as, 'Nubit sponsa marito'; 'The promised one, given herself as a bride to her husband.'

465. Vocabulary 57.

English.	*Latin.*		*Derivatives.*
To marry / To go as a bride	nubĕre	P. R. nups	3rd R. nuptum
To have leisure for / To give oneself to	vācāre	R. vac	vacation
To favour	fāvēre	P. R. fāv	3rd R. faut
To place over	præficere	P. R. præfĕr	3rd R. præfect
To spare	parcĕre	P. R. pĕpercr	3rd R. pars
To join to	adhærĕre	P. R. adhæs	3rd R. adhæs
To pardon	ignoscĕre	P. R. ignov	3rd R. ignōt
To put after	postponĕre	P. R postpōsu	3rd R. postpōsīt
To heal	medĕri, dep. verb		
To fight against	repugnāri, dep. verb		3rd R. repugnat
To grudge / To envy	invidĕre	P. R. invīd	3rd R. invīs
To satisfy	satisfacĕre	P. R. satisfēc	3rd R. satisfact
To place under	suppōnĕre	P. R. suppōsu	3rd R. suppōsit
To lie between	interjicĕre	P R. interjēc	3rd R. interject
Fitly	aptē, adv.		
Equal	pār	G. părĭs	parity
Impious (contrary to law of God)	nĕfas, adj. indecl.		
To think (lead the mind)	dūcĕre	P. R. dux	3rd R. duct
Unjust	iniquus -a -um	R. iniqu	iniquitous
Just	justus -a -um	R. just	justice
To prefer	anteferre	P. R. antetul	3rd R. antelāt
Citadel	arc	G. arcĭs	
The rest	cæterus -a -um	R. cæter	
Duck	ānas	G. anātis	
Speech	sermo	G. sermōnis	sermon
Bad	malignus -a -um	R. malign	malign
To attend	attendĕre	P. R. attend	3rd R. attent
Giant	gigas	G. gigantis	gigantic
Plain	campus	G. campi	camp
Walls / Fortifications	mœnia, I decl., n. g., no sing.		
Greatness	magnĭtūdo	G. magnitudĭnis	
Since	quŏniam, conj.		
Philosophy	philŏsŏphia	G. philosophiæ	
To prove	prōbare	R. prob.	

Each of two	{ŭterque -traque -trumque} (See Less. 31)		
To threaten	mĭnĭtāri, dep. verb		3rd R. mĭnitat
Fame	fāma	G. famæ	famous
Formerly	quondam, adv.		

Note.—'Repugnare' is usually active, but here used by Cicero as a deponent verb.

466. EXERCISE 57.

A.

1. Si (15) qua (Eng., whoever you may be) velis (53) apte nubere, nube pari. 2. Epaminondas irasci (55) patriæ (10) nefas esse (38) ducebat. 3. Iniquissimam pacem (9) justissimo bello (16) antefero. 4. Ascanio-ne (55) pater (14) Romanas (20) invidet arces? 5. Cæteris satisfacio semper (33); mihi (35) nunquam (28). 6. Anatum ova (11) gallinis (11) sæpe (35) supponimus. 7. In amore (49) hæc (37) insunt (50) vitia (46). 8. Homo (5) sapiens (49) sermonibus malignis non attendit (for 'ad-tendit'). 9. Campus ('est' understood) interjacens Tiberi et mœnibus Romanis (20). 10. Magnitudine animi (54) potest (50) repugnari fortunæ (40).

B.

1. Since the one (31) favours corn (10), the other (31) Bacchus (that is, wine). 2. Spare the pious (48) race (28). 3. Philosophy heals minds (54). 4. I am angry with you (35): so (50) ('you reward,' understood) my (20) love (49). 5. I persuade (16) you (35) (of) this (37): he (ille) proves this (37) to me (35). 6. To each he threatened death (8). 7. I put money (45) -after fame. 8. Sicily (Sicilia) formerly joined Italy (20). 9. The giants carried-on-war-against (54) the gods (27). 10. He placed- Brutus -over the forces (46).

LESSON LVIII.

'QUO,' 'QUIN,' 'QUOMINUS.

467. If the dependent clause contain a comparative, 'eo' ('by that') was appended to the 'ut,' and instead of 'ut eo,' the Latins wrote 'quo,' followed, of course, by the subjunctive.

468. Verbs which imply the notion of prevention, whether physical or moral, were followed by 'eo minus' ('by that the less'), appended to 'ut'; so for 'ut eo minus' we find 'quominus,' or, separately, 'quo minus,' which is generally translated by 'from,' with the present participle—as 'Quid te prohibet quominus legas?' ('What prevents you from reading?').

469. If a relative clause contain a negative, the 'non' or 'ne' is appended to 'qui' in the form of 'n' and the conjunction 'quin,' which, of course, is unchangeable, is formed.

470. 'Quin' is also found after verbs of doubting, and may be translated as 'but' or 'that.'

471. 'Quin' is sometimes written for 'Qui non?' ('How not?'), and is translated by 'But!' or 'Why?' and is then generally found with the indicative mood. If it is found with a subjunctive mood in an independent clause, it may be translated by 'Nay!'

472. VOCABULARY 58.

English.	*Latin.*		*Derivatives.*
Ignorant Unskilled	{imperītus -a -um	R. imperit	
To comprehend To pursue	{tĕnĕre	P. R. tenu	3rd R. tent
To deter	dēterrēre	P. R. deterru	deterrit
Medicine	mĕdĭcāmentum	G. medicamenti, n.g.	
Solitude	sōlĭtūdo	G. solitudinis	
To protect	prōtĕgĕre	P. R. protex	3rd R. protect
Torment	tormentum	G. tormenti, n.g.	
To prevent To be an impediment to	{obstāre	P. R. obstĕt	No 3rd R.
Study	stŭdium	G. studii, n.g.	
Eternal	æternus -a -um	R. ætern	
To plight	pacisci, dep. verb		3rd R. pact
Wedlock	hymenæus	G. hymenæi	
To celebrate	exĕrcĕre	P. R. exercu	3rd R. exercit
To tell	nārrāre	R. narr	narration
To spoil	dēpravāre	R. deprav	depravity
To leave undone	prætermittĕre	P. R. -mis	3rd R. -miss
Connection	conjunctio	G. conjunctiōnis	
To dissuade	avocāre	R. avoc	
To open	aperīre	P. R. aperu	3rd R. apert
Window	fĕnestra	G. fenestræ	
So	tam, adv.		
Difficult	difficilis -le	R. difficil	
Hostile	infestus -a -um	R. infest	
Assembly	concio	G. concionis	
To keep back	inhibĕre	P. R. inhibu	3rd R. inhibit
Stone	saxum	G. saxi, n.g.	
To scour (as a pirate)	{răpĕre (*i.* verb)	P. R. rapu	3rd R. rapt
Ægæan	Ægæus -a -um	R. Ægе	
Large	vastis -a -um	R. vast	
Ship	trabs	G. trabis, f.g.	
Burdened	onustus -a -um	R. onust	
Yesterday's	hesternus -a -um	R. hestern, adj.	
To weigh down	prægravare	R. prægrav	
To come up with	consequi, dep. verb		3rd R. consecut
To-day	hŏdie, adv.		
To overflow	exŭbĕrāre	R. exuber	
Produce	fœtŭs	G fœtŭs	
Cattle	pecus	G. pecoris, n.g.	
Sheaf Reaping-hook	{merges	G. mergĭtis, f.g.	
Cereal	cereālis -le	R. cereal	
Straw	culmus	G. culmi	

473. EXERCISE 58.

A.

1. Legem (5) brevem (49) esse (38) oportet (48) quo facilius (29) ab imperitis teneatur. 2. Non dubitat (52) quin brevi (49) (understand 'time') Troja (Troy) sit (38) peritura (56). 3. Parmenio (nom. case) Philippum deterrere voluit (53) quominus medicamentum biberet (14). 4. Tiberium non solitudines protegebant quin tormenta pectoris (37) fateretur (48). 5. Quis (30) est (38) quin audiverit? (4). 6. Senectus (48) nihil (31) obstat quominus litterarum (51) studia teneamus. 7. Quin potius (54) pacem (9) æternam pactos-que hymenæos exercemus? 8. Nihil (31) est (38) quin male (28) narrando possit (50) depravarier (old form for 'depravari,' inf. pres. pass.) 9. Ego (35) nihil (31) prætermisi quin Pompeium a Cæsaris conjunctione avocarem. 10. Quin dic (15) statim (18).

B.

1. He opened the window, that he might see (27) the better (49). 2. Who (30), therefore (30), can-doubt (52) that there are (38) riches (39) in virtue (26)? 3. Nothing (31) is so difficult but that it can (50) be investigated (52) by seeking (56). 4. The hostile assembly could (50) scarcely (39) be kept-back from forthwith (41) throwing (52) stones at (Lat., 'in') Cæsar. 5. Nothing (31) prevents you (35) from scouring the Ægæan in a large ship. 6. But a body (15) burdened with yesterday's vices (46) weighs down also (20) at the same time (Lat., 'una') the soul (54). 7. I left nothing (31) undone to come up with you (35) to-day. 8. Nothing (31) prevents you (35) from doing (43) this (37). 9. Nay! Let us try (56). 10. Nor (48) is (38) there rest (38), but the year (17) either (53) overflows with apples (12), or (53) with the produce of cattle, or (53) the sheaf of the cereal straw.

LESSON LIX.

474. We propose in this lesson to give as an exercise an entire Fable of Phædrus, and, instead of

giving some English to be translated into Latin, to ask ten questions on the grammar and parsing.

475. VOCABULARY 59.

English.	*Latin.*	*Derivatives.*
To show	exserēre	P. R. exseru 3rd R. exsert
Story	narrātio	G. narrātionis
Stag	cervus	G. cervi
Water	liquor	G. liquōris
Branching	rāmōsus -a -um	R. ramos
Leg	crus	G. crūris, n. g.
Excessive	nimius -a -um	R. nimi
Slenderness	tenuitas	G. tenuitatis
To find fault with	vituperare	R. vituper vituperate
To hunt	vēnāri, dep. verb	3rd R. venāt
To frighten	conterrēre	P. R. conterru 3rd R. conterrit
Running	cursus	G. cursūs course
To baffle	ēlūdere	P. R. elūs 3rd R. elūs
To receive	excipēre	P. R. excēp 3rd R. except
Beast	ferus	G. feri fierce
Entangled	retentus -a -um	R. retent
To hinder	impēdīre	P. R. impedi 3rd R. impedīt
A bite	morsus	G. morsūs morsel
Savage	sævus -a -um	R. sæv
To die	morīri dep. verb	3rd R. mortu
At last	demum, adv.	
To despise	despicēre	P. R. despex 3rd R. despect
How much	quantum, adv.	
Sorrow	luctus	G. luctūs

476. EXERCISE 59.

A.

FABLE OF PHÆDRUS.

Cervus ad Fontem.

Laudatis (2 utiliora (53), quæ (27) contempseris (49),
Sæpe (35) inveniri (28), hæc (37) exserit narratio.
Ad fontem (12) cervus, cùm (Less. 41) bibisset (14), restitit,
Et in liquore vidit (27) effigiem (22) suam (20).
Ibi (28) dum (21) ramosa mirans (45) laudat (2) cornua,
Crurum-que nimiam tenuitatem vituperat,
Venantûm subito (33) vocibus (7) conterritus,
Per campum (57) fugere (27) cœpit (37), et cursu levi (49)
Canes elusit. Sylva (11) tum (20) excepit ferum:
In quâ (27) retentis impeditus cornibus (42),
Lacerari (55) cœpit (37) morsibus sævis canum (14).
Tunc (51) moriens vocem (7) hanc (37) effundisse (39) dicitur:
'O me (35) infelicem (37)! qui (27) nunc (27) demum intelligo (5),
Utilia (53) mihi (35) quam (48) fuerint (38), quæ (27) despexeram,
Et quæ (27) laudâram (2), quantum luctûs habuerint (7).'

NOTES.

Line 1. Laudatis, perf. pass. part., abl. after comparative.
,, 7. Venantûm, for venantium, for sake of metre.
,, 10. In qua, resolve the 'qua' into 'que eâ'
,, 13. O me infelicem, acc. for voc.
,, 14 and 15. In both lines 'ea' is understood as the antecedent of 'quæ.'

B.

1. Parse 'contempseris.' 2. Write down plural of 'fontem.' 3. Give sing. of 'effigies.' 4. How do we English turn the expression 'mirans laudat.' 5. What parts of the verb 'cœpit' are wanting? 6. What is the peculiarity of the word 'canis'? 7. In line 12, what is the antecent of 'qui.' 8. Parse 'intelligo' 9. In last line, what is 'laudâram' written for? 10. Why is 'luctûs' in the genitive case?

(To be continued.)

Science Notes.

CHOLERA.—Some weeks ago, when lecturing on Cholera, Professor Sanderson expressed his conviction that if the cholera had intended to visit us this year it would, before then, have been on its march. So far his cheerful prophecy has proved true. The terrible havoc it has wrought in Spain only too seriously reminds us what a dire enemy of life it is. If we feel uneasy that at present its origin is unexplained, we can derive no little comfort from the fact that the methods advocated by English physicians for averting it are becoming more and more generally accepted. Pay attention, they say, to the sanitary condition of your houses and surroundings, and put no trust in quarantine. We are all vitally concerned in carrying out this excellent advice. We are all, to a greater or less extent, at the mercy of our neighbours. We must not only see to it that the cisterns are clean, the drainage good, the refuse removed, and the air in the house kept sweet, but we must try to form and stimulate public opinion on these points. Much yet remains to be done in this matter. A manufacturer whose chimney smokes is prosecuted, and not improperly; a neighbour has no right to cause annoyance of any kind, but neglect of sanitary precautions may bring danger to a whole street. What we want is a healthy public opinion upon such matters. There is no doubt at all but that whooping-cough would be almost, if not quite, an unknown thing among children if it were not for the culpable neglect of parents. Here it is simply a question of isolation, and at present public opinion does not insist upon it.

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There is no student of biology in England who is not acquainted with the 'Practical Biology' of Huxley and Martin. Biology is, happily, a subject which is always studied practically when it is studied at all. Students who are able to attend a course of instruction in a well-appointed laboratory—such, for instance, as Professor Lankester's at University College—are independent of text-books. Schedules and full directions are supplied, and the demonstrator is at hand whenever the long-sought organ refuses to come to light; and how often this is, those know who have tried to dissect the mussel or the common earthworm. But there must be a number of students who have to work by themselves in places far removed from colleges and laboratories. A book has been published during the last month which will be a real boon to such students. It is an 'Atlas of Practical Elementary Biology,' by G. B. Howes, with a preface by Professor Huxley. The atlas is in all respects admirable. There are twenty-four plates. All the types included in Huxley and Martin's 'Practical Biology' are included, and the snail and earthworm besides. We have no doubt that many private students will be very glad to have had the book brought under their notice. Nothing can quite compensate for the assistance of a teacher. Where one cannot be got, an atlas is the best substitute.

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A most important paper was lately read before the Society of Telegraphic Engineers, by Professor Jamieson, on Electrical Definitions, Nomenclature, and Notation. The rapid and universal adoption of the units of the Electrical Congress have encouraged the hope that we may soon have a uniform nomenclature

and notation. The author suggests that a committee be formed to draw up a series of definitions, nomenclature, and notation that would be generally acceptable. This committee is then to confer with a French committee, and one from the British Association, and, finally, their labours are to be referred to an international congress. An influential committee has been formed, and it is hoped that the work will be speedily and satisfactorily done. It is premature to say what changes may ultimately be agreed upon. Our readers will be informed of them as soon as they are made known. The enormous advantage of uniformity is obvious to all. In passing from author to author the student has, in many cases, to translate as he goes on. The beginner is simply confused; he does not recognise the same thing under a new guise—he is simply bewildered. It is hardly too much to say that a boy who often changes his school loses half his time, because of the new phraseology he meets with. Whoever writes a new grammar, feels himself entitled to invent new names at his pleasure.

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Farming.—What may be the future of English farming it is not easy to say. That it will be a very different kind of business from what it is now is quite certain. The operations in brewing, malting, or gas manufacture are not more complex than those involved in agriculture, and yet how differently they are managed! In the one case we have due regard to the quantities employed, to temperature, to time. It is fully recognised that unless certain conditions are satisfied, satisfactory results will not be obtained. It is true that some of the most important conditions to ensure a good crop are less under control than those requisite to produce a glass of good beer. That, however, is no reason for neglecting to control what is within our power. The agreement is very general indeed that English farming is unscientific, and therefore wasteful. How deeply this is felt was proved by the action of the Science and Art Department, which has not only tried to supply what was sorely needed, but also to create a desire for it. Hitherto the class which most needs enlightenment has not been anxious for instruction. A comparatively new departure is now being taken. The Royal Agricultural Society is receiving support in its endeavour to establish experimental farms in various parts of the country. Here the farmers will be able to see for themselves the effects of the different foods employed for plants and animals. Much money may be saved by a proper and economical use of food and manures. What is refused as precept may be attractive when presented in the form of example. When once the value of accurate knowledge is known, we may be sure there will speedily spring up a strong demand for it.

Publications Reviewed.

Simple Sketches from Church History for Young Persons. By Mrs. Toogood. Fifth Edition. John Heywood.

We once saw a great actor playing the part of a rough, honest fisherman, which, for the most part, he wonderfully well sustained; but, unfortunately, the play contained one or two fine speeches for this homely toiler of the sea, and then the actor was lost in the elocutionist. He had some fine things to say, and he could not help saying them as perfectly as possible, and as unlike a fisherman as could be.

The authoress of this little book makes the same sort of mistake. She sits down to write something very, very simple for young people. Generally she succeeds, but from time to time she is carried away by her all-absorbing subject, and flies into a florid, grandiloquent style, which is by no means within the reach of those she is writing for. On page 163 we read: 'When we pray for bishops, priests, and deacons, etc. . . . . we pray in the words found in the most ancient liturgies; we offer an incense of prayer that has been streaming (surely a printer's error) from the altars of earth's redeemed through past ages.'

The short preface tells us that her inability to find anything simple enough to enable boys and girls to learn what is meant by the Holy Catholic Church, has induced her to put together these chapters.

The first five chapters carry us over Biblical ground, and are certainly much less interesting than the others. In the first chapter we are told that Hebrews were so called from Heber, or Eber, the sixth ancestor of Abraham. True, we knew of two possible derivations of the word before, but never heard of this one: and we are particularly sorry to note that the common error of connecting Whitsuntide with 'white' is perpetuated. We thought everybody now knew that Whitsun was the Saxon for fiftieth, and that the choice of that particular feast for baptisms, when the catechumens doubtless wore white garments, was a mere coincidence.

Some of the chapters are headed by the name of a saint, and some otherwise—*e.g.*, Chapter XIX. is headed 'The Danes.' It gives a short account of Alfred the Great—very much as we should find it in all children's histories, cake-story and all—of the English divine Alcuin, and a few lines as to the influence against Christianity these northern pirates exerted. The last chapter contains a sketch of good Bishop Wilson, finishing with an account of John Wesley's work, which the authoress fulminates against as a mighty schism, and which she uses as an opportunity for some of the fine writing referred to above.

In conclusion, it is only fair to add that some of the sketches are admirably adapted for young people. The history, for instance, of the sale of Indulgences struck us as particularly happy. The book is strongly and plainly got up, the printing being very good and clear.

Analysis of the Book of Judges. With Notes, Critical, Historical, and Geographical. By Lewis Hughes, B.A., and Rev. T. Boston Johnstone. John Heywood.

It was only last month that we drew the attention of our readers to an Analysis of I. Samuel, by the former of the two authors named above. The work now under review was published prior to the other, and we cannot help fearing that that, though justly praised by us, has lost something by the dissolution of partnership, this manual striking us, on the whole, as better than the other.

We are glad to notice in the preface the following:—'The plan of study we recommend is to read the narrative portion of this Analysis first, and after this is done to *take the Bible* and study the book, chapter by chapter,' etc. The great fear of all analyses is that they will keep students away from their Bibles. Only the other day we saw an examination paper for candidates for Holy Orders, which seemed almost to have been prepared with the one idea of finding out how much of their knowledge was obtained from the Bible itself, and how much from other sources.

We notice the difficult question of the periods of years, with which so many of the stories and chapters end, is entirely passed over, no explanation being offered of the oft-repeated 'forty years'; and though we are told in the narrative portion of the book that some of the judges ruled over several of the tribes, while others only ruled over one tribe, this is not gone into with any detail. The authors very wisely do not dare to dogmatise one

way or the other on the method of the fulfilment of Jephthah's vow; and we are delighted to find them branding Jael, in spite of Deborah's praise, as a murderess and traitress. We know few things worse for young people than to be brought up with the idea that the end justifies the means, by whomsoever enacted. We would rather teach children that imprisonment had warped the Baptist's faith than that he was guilty of a lie.

The examination questions at the end of each chapter are very suggestive and exhaustive. The map of Canaan is not as clear nearly as it might be; otherwise the book is all that we could wish or expect it to be, and would prove eminently useful, if fairly treated as suggested by the authors.

Paragon Arithmetical Examination Papers. Standards I. to VII. By J. S. Horn. London: John Heywood.

Eighty-four pages, with never less than sixteen questions on a page, and in the first Standard a great many more—for fourpence—is really a marvel of cheapness. The questions are varied and well adapted to prepare the children for their inspection. We presume the answers are or will be published; but we can see no notice of them in the work itself, which is without preface or hint.

Lessons for Deaf and Dumb Children in Speaking, Lip-reading, Reading, and Writing. Part II. By William van Praagh. London: Trübner and Co.

We remember many years ago—before, we believe, teaching deaf mutes to articulate was much practised—hearing a little lad of nine or ten recite, 'The Arab's Farewell to his Steed,' for which he gained the first prize for elocution over others nearly double his age. On inquiring as to how he had gained his wonderful powers—for wonderful they really were, as far as clear articulation was concerned—we were told he had a stone-deaf grandmother, to whom he and the family generally talked with their lips. Having witnessed this, we are not astonished that it occurred to some, interested in these unfortunate creatures, to teach them so to articulate and read their companions' words. We have been given to understand that, for a time at any rate, the children dislike this method of communication; and as they get no assistance whatever from their ears as to the inflexions of the sounds they are producing, it is somewhat painful for one who can hear, thus to talk to them.

Excepting the fact that some of the words printed for reading have their emphatic syllables italicised, as O-ver-*look*, A-*sy*-lum, there is nothing whatever to distinguish the little work from an ordinary reading book for Standards I. and II. The lessons at the end consist of very partially-connected sentences, with not sufficient story in them to help the child by the context. The compiler is evidently one well qualified to put forth such a book, being the Director of the School and Training College for Teachers of the Association for the Oral Instruction of the Deaf and Dumb; and also Officier d'Académie (France); and it is possible there may be some special advantages in the compilation the uninitiated are unable to fathom; but as it stands, we have seen many reading books equally well printed, if not quite so neatly bound, twice as large for half the money.

Lays and Ballads of Heroism. By Henry J. Barker. London: Nisbet and Co.

Mr. Barker, the title-page tells us, is Lecturer on English Language and Literature to Pupil Teachers under the London School Board. Like many others of different professions, he evidently thinks because he knows—as doubtless he does, to hold so important a post—a great deal about language and literature, that therefore he is justified in putting forth literary efforts of his own. In music, great executants are not often great composers, and even celebrated organists have proved themselves wretched conductors; but, still, if they have the opportunity of figuring in another branch than their own they are very apt to do so. To say that Mr. Barker is no poet at all would be untrue; he chooses subjects thoroughly adapted to poetic treatment, and here and there touches a sensitive chord; but he is a very bad versifier. Scarcely a stanza runs smoothly; there is a haste or a hurrying that may be excusable in some veteran of the art, but certainly should be avoided by one who, as far as we know, is sending forth his maiden effort.

Some of the poems are headed by extracts, such as a paragraph from Sims's 'How the Poor Live,' to justify the story depicted. Others have no such suggestions. One of the prettiest stories in the book is called 'The Scotch Student.' But we are not told whether it is true or the creation of the author's brain.

The fifth effort, titled 'St. Edmund,' is a more ambitious one, running into nearly if not quite 600 lines, in which there are some of the sweetest stanzas contained in the volume.

The majority of the numbers are, strictly speaking, ballads or lays, with a definite story to tell. But at the end we have four or five short pieces of a different character, entitled miscellaneous, from which we venture to quote the first stanza of one entitled, 'A Choral Hymn':—

'Come, votaries of harmonious breathing, come!
Take some the pipe, the hautboy, clarion; some
The bassoon. Now nurse your magic spell!
And ye, whose touch the stringed shell
Can woo, and woo it well,
On either side Cecilia's pile
Recline; and when her yearnings wane
In subtle harmony the while
With sprightly charm the air beguile,
And change the sad refrain.'

The author, our readers will perceive, was not going to lose the opportunity of showing the reading public that he could write in a very different strain, if he chose, from the more homely ballad, of which the following is decidedly a happy example, taken from 'The Visiting Day at the Hospital':—

'Before that crib, where lies her child,
See yon poor mother kneel;
The little fellow's spine is sprained:
She knows it ne'er will heal.
Again she sees his writhing form
Upon the garret stair
As when she came from work that morn,
And found him moaning there.'

The book is clearly printed, bound in thick paper, and very cheap.

A Short Table of the Principal Events and Dates in Roman and Greek History. By Rev. H. P. Owen Smith, M.A. London: Longmans.

This is practically a very small note-book, duly ruled and prepared for the insertion of such facts as the master of a class, or an intelligent student, may wish to make. It only consists of five double pages, divided into three columns, of which the first is filled with such printed matter as 'First Persian Expedition against Greece,' 'Storm off Mount Athos, 493'; the second and third columns being blank and headed respectively with (1) Wars and Battles; (2) Political Events and Important Persons.

Two and a half of these double pages are devoted to Roman History, concluding with: 'Napoleon I. puts an end to Holy Roman Empire, 1806'; the rest being devoted to Greece, which begins with the siege of Troy; and concludes with the subjection of Greece by Rome in 146. Why Mr. Smith should have put the Roman part before the Greek, I cannot imagine. The paper doubtless is very thick and good, and suitable for a pen; but in these days of cheap literature, etc., we are afraid the author, beyond his own school, will not get many students to pay rather more than a penny a page for what is very little more than a well-arranged note-book.

Geographical Reading Books: Europe and America (excluding British Possessions). By G. G. Chisholm, M.A. London.

This volume is what it pretends to be, and very little more, viz., a reading book. As such, the chapters are well-written and interesting—full, and not too full, of information. At the same time, teachers who wished to prepare classes for examination in geography could not depend solely on the knowledge gained from these lessons. Physical—that is, as far as the surface of the earth is concerned, and not in its technical meaning—geography occupies more of the book than what is usually called political. There are, it is true, separate lessons on the productions of Europe, North America, and South America, and three more lessons on the peoples of these three continents; still they do not contain anything like information enough for examination purposes. We are told, for instance, that 'In almost all cases the people (of Europe) make laws for themselves, through representatives whom they elect to form a Parliament or Legislative Assembly. Such countries are said to have a free representative government, and this government may be either a republic or a monarchy.' The exceptions to this rule, Russia and Turkey, are mentioned by name; but whether Denmark, for instance, is a republic or a monarchy, we failed to gather from the book. We do not say this, for a moment, in condemnation of the book—far from it—but only to inform others than experienced teachers, who would, of course, know what to expect in a 'reading book,' the true nature of the volume before us.

The chapter on the Alps struck us as decidedly interesting and very instructive. That, too, on the people of Europe is full of information, and put in a more scholarly way than one generally finds in such works.

The last twenty pages of the book are more after the fashion of an ordinary geographical manual, and are, of course, intended to be learnt, and not simply read. They contain tables of populations, lists of seas, towns, and animals, concluding with four small maps, which are not particularly clear.

Like all Messrs. Longmans' educational works, the volume is beautifully printed, and strongly, as well as attractively, bound.

Map-Drawing Copies. Blackie and Son.

These maps, the preface tells us, are designed for school and home use. Wisely or unwisely—we do not presume to say which—the editor has adopted Mercator's Projection. With maps of small areas, this does not much matter, but when a map extends from the Arctic to the Antarctic Circles, we almost fear the system gives to those who know nothing of projections a wrong notion of the comparative size of the less-known portions of the earth's surface.

The outlines are very strong and clear, the smaller divisions being shown with dotted lines. The printing of the names may be called imitation school-boy printing, giving the maps very much the appearance of what they ought to become after transcription. Some of the maps are devoted to the lands drained by a single river, and this we heartily commend. At the end of the little atlas there is a map of the oceans, showing the hot and cold currents, in which we confess it is a little difficult, at first sight, to distinguish between currents and outlines of countries. We are glad to see that the student is advised, in the preface, in all cases to draw *first* the outline and the parallels of latitude and meridians of longitude, and then to use these lines in copying the outlines. The atlas costs 1s. 3d., and is bound in limp cloth, the number of maps being about thirty.

Bell's Ladies' Reader. By David Charles Bell. Hodder and Stoughton.

It is, indeed, many years since the name of Bell was first connected with the art of elocution. Thousands upon thousands of copies of Bell's 'Standard Elocutionist' must have been circulated in the United Kingdom, her Colonies, and the States of America. As a collection of examples for recitation, if for nothing else, it would have been eagerly sought after; but, with its clear elucidation of the principles of elocution and its invaluable exercises, it is almost a necessary volume in the collection of any who would read or recite, either in public or for the edification and amusement of the home circle.

This book before us contains some twenty-four pages on the principles of elocution, including the theory of inflexions, extracted from the older work.

The rules for rhetorical pausing given on page 23 might, we think, be condensed into a smaller compass with advantage. The fewer the rules, the more likely are they to be retained in the memory and used.

The bulk of the book (292 pp.) consists of well-classified collections of poems, longer and shorter. These are printed sometimes in a poetic form and sometimes in a prosaic, for the purpose, so says the heading to the first extract given, 'of obviating the too rhythmical delivery which is often associated with metrically-printed LINES, and as an assistance to the habitual use of pauses and tones in strict accordance with the SENSE.' The book being prepared for ladies, great care has been taken to admit nothing that could by any be considered unfitted for their study.

The second division of the first part consists of a selection from Thomas Moore's Irish Melodies—a very pardonable preference for any Irishman, as doubtless Mr. Bell is, to make in such a collection.

The third division contains forty-seven pieces of a more distinctly religious character, including some of Mrs. Hemans' happiest efforts.

In the second part, prepared for senior pupils, the exercises are longer, containing such well-known pieces as Tennyson's 'Song of the Brook,' Campbell's 'Pleasures of Hope,' and Hood's amusing description of 'Our Village,' and these are followed by a selection of lyrics.

The third part commences with some ballads and miscellaneous poetry for advanced pupils, to which are added some sonnets and specimens of blank verse, concluding with a few extracts from dramas.

There is a well-arranged index, under the authors' names. The book is got up in Messrs. Hodder and Stoughton's usual liberal style, and is marvellously cheap. We heartily recommend it to every ladies' school in the land as the best collection we have ever seen, with only one author, of any note, that we remarked as unrepresented, viz., E. A. Poe.

The First Three Years of Childhood. By Bernard Perez. W. Swan Sonnenschein.

The above is edited and translated by Alice M. Christie, who has already given to the world, amongst others, a translation of a book on the same subject, viz., 'Child and Child Nature'; and she has done her work so well that it hardly at all reads as a translation. One of our own psychologists, James Sully, M.A., has added an introduction, which is not the least interesting part of the book.

Before treating the work in detail, we must say that we wish some of the lessons, to be gathered thence, could be put into a popular and cheap form, and placed in the hands of every mother, teacher, and nurse throughout the land. In its present form, it is far too difficult for one who is not well—almost highly—educated to thoroughly follow. Though the book is full, from end to end, of charming and amusing anecdotes of baby-life, the application of the majority of them, to press the lesson intended to be given, would be undiscovered by many and undiscoverable by others.

We remember, some years ago, reading a popular work on philology, in which the author had devoted a section to the lessons in language to be learnt in the nursery. No doubt, M. Perez felt in the same way that the study of psychology must be begun from the very beginning; and so far back has he gone that he has actually quoted some medical testimony as to the sensibility and spontaneity of the fœtus; the first chapter being devoted to (i.) the faculties of the infant before birth, and (ii.) the first impressions of the new-born child. We next come to motor activity at the beginning of life, and this chapter,

which is naturally far easier reading than its predecessor, is sub-divided into sections, headed with progressive ages, as six months, fifteen months.

M. Perez is, according to Mr. Sully, a disciple of the theory of evolution; in fact, he calls him 'an ardent evolutionist,' and one of the proofs of this is his constant reference to the difference of children according to what they have inherited from their more immediate ancestors. We mention this, because we cannot help thinking that the majority of the examples cited were very highly favoured children in this respect. Before this subject can be considered to have been thoroughly ventilated, it will be necessary for these close observers of nature to have other children to watch than those of exceptionally clever men and, may be, women. Let them first get possession of a child who has had a long line of ancestors, with no idea than that of providing daily food for themselves and their children by some very simple drudgery, and after that let them get at children of other nations—less civilised—and then deduce their theories. We have constant references to the recording of Tiedermann, Darwin, and others, with regard to their own children; and very wonderful things they, especially the first-named, saw—in fact, M. Perez almost doubts the accuracy of the dates of some of Tiedermann's observations.

The principal object of this work is to press the importance of the subject from an educational point of view: were it not so, we should hesitate to occupy so much of our space in its discussion.

In the chapter on the sentiments, the author, under certain circumstances, warmly defends children when charged with anger. He says, 'Anger is legitimate in young children when it expresses unconscious revolt against the first sufferings of life. . . . . In like manner, when a child, in its first awkward attempts at speech, has given a wrong idea of its meaning, it is quite justified in screaming, beating the ground with its foot, and showing indignation at being so badly understood when it thought it had spoken so well. It has still more right to be angry, when, after having been accustomed by its nurse to any bad habit, such as being rocked to sleep in its cradle or in any one's arms, or being put to bed with a light in the room, these habits are suddenly discontinued. . . . Another case, mentioned by Rousseau, in which a child's anger is perfectly legitimate, is when the nurse beats it for crying.' He then goes on to show how certain forms of impatience betoken a frank and generous character; at the same time he freely confesses that anger has its evils and abuses, being often the outcome of caprice, jealousy, and hatred; and he evidently feels that nothing is more important than that everything and everybody likely to produce anger should be removed as much as possible, as, when indulged in, it not only does harm morally but physically. Parents and teachers are doubtless justified in detracting children's attention from that that is angering them, instead of conquering the passion exhibiting itself. One of the most valuable deductions of M. Perez's experiments seems to us to be that a child would far rather be told to do something than to leave something undone; the moral of which is—when a child is doing what it ought not to, stop it *indirectly*, by telling it to do something else.

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A longer chapter, towards the end of the book, on expression and language is particularly valuable as well as interesting. We wish we had space to take our readers more into the details of the work. Unscientific readers should not be frightened at the many technicalities of the introduction and earlier chapters, but begin with one of the middle ones and work back to the more difficult ones. We, however, think, as we said at the beginning, that the translator might, with great advantage, prepare an easier manual, free from anatomical disquisitions, and with the deductions from the experiments more clearly set forth.

Social Economy for Children. Arranged by Ethel E. Ellis. Educational Supply Association.

We can understand the horror one of our grandfathers *would* have felt, if, when asking a little child what it had been doing at school, he received as an answer, 'Social Economy, sir'—if, that is, it could have pronounced the words—and there are, too, modern ratepayers who, we fear, *are* nearly as much annoyed—for their pockets' sake, if not for the thing itself—as our ancestors would have been. At the same time, we have very little doubt but that the children of the last century knew quite as much as those of the present time as to the great importance of cleanliness and regularity. If what our parents tell us is true, there were quite as good domestic servants then as now; and the wives and mothers of the labouring classes of the past kept as comfortable and as clean houses as they do in the present.

The question before us, however, is, How has the arranger of this book done her work, and to what extent is it adapted for the end in view? It is called a series of reading *lessons*, and not intended to be put into the hands of children as a reading *book*. They are arranged, as the preface tells us, chiefly from the writings of Mr. Ellis, whose own work on the subject is referred to at the end of the preface, in the following eulogistic terms:—'Should any teacher wish for further information, ... they are recommended to consult . . . . or, better still, that small book, unsurpassed for clearness of exposition, entitled "Lessons on the Phenomena of Industrial Life," edited by Richard Dawes, M.A., Dean of Hereford, but written by the late Mr. William Ellis.'

The lessons, of which there are forty-eight, of about a page and a half each, unfortunately have no headings. Under these circumstances, there could not very well be a 'table of contents,' but there might have been—which there is not—an index. This, we think, is a very grave defect. To take two examples—Lesson I. seems to wish to show children how to distinguish between necessaries, comforts, and luxuries, and then to suggest as to whence these come to little children, urging that it is their parents' duty to do this, which said duty every one acknowledges; and this seems to have suggested—as there are duties not so easily seen and acknowledged—a definition of 'Social Economy,' viz., 'The knowledge which helps us to tell right from wrong, and makes us love the right and hate the wrong.' To take one other example—Lesson XII. cleverly treats with the subject of machinery, as being a detriment to the labourer. Are there any parts of this country where this lesson has now to be taught? If so, at any rate, it is really well taught here.

Though the arranger is particularly careful in her style, she sometimes allows herself to use such words as 'fabric,' 'reservoir,' 'thriftless,' and others. At the end of every lesson there are a few questions, which the teacher is supposed to supplement with many others. We believe the book might be used with considerable advantage by an intelligent teacher

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In spite of the comparative simplicity of the title, this work is in advance of the last reviewed, and is evidently intended to be used as a *reading* book, and by older children.

The introduction is headed with a quotation—in fact, all the chapters are—which we quote in full: 'The importance of the home it is impossible to exaggerate. What is liberty without it? What is education in schools without it? The greatness of no nation can be secure that is not based upon a pure home life.' (Arnold Toynbee.) The authoress then preaches or, let us rather say, talks a beautiful talk on this theme. The lessons are principally—in fact, we may say, entirely—addressed to girls, who are assured that, if they only would learn and realise it, they have it in their power to become queens—and the authoress' object is to make them queens; concluding this, her introductory chapter, by stating that what she has in view is to teach her pupils how to turn a house into a home, where, as she has said before, a woman may be 'as a servant in her husband's house, and as a queen in his heart.'

As we have already said, in addition to a heading giving a summary of the contents of each chapter, there is a most happily chosen quotation from the works of such authors as Joseph Mazzini, Dr. Davies, Prof. Simpson, John Ruskin, Wm. Morris, and many others. And we should feel inclined to recommend those using this work to insist upon their classes learning these quotations by heart. They would be unto them as a store of maxims which would be invaluable through all their life.

The first two chapters, not counting the introduction, are on the choice of a home; the next two as to how to get fresh air and warmth and light; and the next three on the furnishing, and not only with the useful, but also the beautiful. Then we come to several chapters on food and drink, where we are not surprised to find every inducement inculcated to do without stimulants altogether. After this we have chapters on what are termed the history of a few day meals, in which we find tables giving the amount of strength-giving and flesh-repairing matter required for father, mother, and each child, and how these ought to be distributed between the three meals, and in what way this can be best done.

It is impossible to go through the entire book; suffice it to say that nothing seems forgotten. Scarlet-fever, small-pox, etc., all receive attention.

Naturally too that all-important personage the baby—whose neglect or otherwise has so much to do with the comfort of any but very large houses—is fully discussed.

In schools where this prettily-bound little book is not used as a reading book, it would make an admirable prize to any girl leaving school, even though she may have gone through other courses of domestic economy. The tone of the book is so healthy and affectionate, that we are delighted to highly recommend it to all interested in the welfare of our country.

The Compendious English Grammar, preceded by a Sketch of the History of the English Language. Blackie and Son.

The author, or authors, of this admirable work have not published their names, but, whoever he, she, or they may be, certain it is, a very valuable book has been given to the world, and one which ought to make its way into other schools, etc., than those under Government inspection.

The short preface tells us that it has been prepared as an enlargement of the Elementary Grammar in the Comprehensive Series of School Books; but we may assure those thinking of purchasing it that it requires no preparatory work, as it begins with the very rudiments of the subject.

The historical sketch of the language, contained in only fifteen pages, is really, for its length, a mass of information, compiled in a most interesting way, concluding with the same passage of the Bible, printed side by side, in four columns, showing the differences and growth in the language, from the Anglo-Saxon Version of 1000 to the Authorised Version in 1611, the other two versions being that of Wiclif (1380) and Tyndale's (1526). In the last three of these, all words other than of Saxon origin are printed in bold type, showing what a small fraction they form of the words in our language.

We are delighted to see that the changes the mutes undergo, when meeting in composition, are classified and explained.

There are also in this first part, on orthography, other rules as to spelling, with lists, more or less complete, of exceptions.

In the lists of affixes and prefixes, though the meaning of the Latin and Greek prepositions are given, we are sorry to see no attempt is made to account for some of the English affixes, as -ness, -en, -ar, -yer, -th. Philologists, we know, are very divided about some of them; but we cannot help thinking something might have been said about such words, for instance, as 'hood' and 'ness,' especially as they are so often asked for in higher examinations. There are no less than 490 Latin and 205 Greek words given, from which English words are derived.

There are also thirty-two pages of exercises at the end of the book, some of which, printed full of mistakes, are to be corrected, a useful method for cultivating the perceptives.

There are no entire examination papers as recently given, but, before the exercises, there is a fair number of questions selected from those set for the Queen's Scholarships.

The book is well bound, clearly printed, important words being made prominent by bolder type, and only costs 1s. 6d. We heartily commend it.

Outlines of the World's History, Ancient, Mediæval, and Modern. By Edgar Sanderson, M.A. Blackie and Son.

When the world's history is contained in a well-printed volume of 664 pages, we do not require the word 'outlines' in the title-page, for what else could it be? The said title-page tells us that the work is prepared with the special relation to the history of civilisation and the progress of mankind; and the short preface enlarges upon this somewhat, by assuring us that it 'includes an account of the contributions made by the chief peoples of the world to the common stock of civilisation; of the great steps in human progress, the discoveries and the achievements in art, science, literature, politics, and war, which have brought the world into its present condition.'

At the end of the volume there is an index, and, as far as we have compared it, a very full one—*e.g.*, on pages 625, 626, in the chapter containing American Literature and Art, there is a paragraph on E. A. Poe, which is duly indexed. To test to what extent the above promise, as to recording the modern achievements in art, science, war, etc., was fulfilled, we turned to the index for certain things, but it did not direct us to anything on Telephones, Torpedoes, or Electric Lighting. At the same time, we are bound to acknowledge that though the title-page bears the date 1885, we see, on page 640, that the story of the book is supposed to conclude with Stanley's search for Livingstone, and his further travels up to 1877, by which time the aforementioned discoveries were certainly not as advanced as they are now.

We confess we do not quite see for what class of readers or book collectors this volume is intended. It certainly is not fitted for a text-book for schools. Very few men would have the courage to sit down to read it as an amusement, as, necessarily, it is far too full of facts, and those told in the fewest possible words; and as simply a book of reference it is not sufficiently copious, nor, as we have shown, up to date.

There are several maps, which are clearly drawn, and the work is very fairly illustrated with portraits and sketches more or less authentic. The binding and printing, and, we may add, price (6s. 6d.), are all in Messrs. Blackie's usual liberal style.

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In schools where this prettily-bound little book is not used as a reading book, it would make an admirable prize to any girl leaving school, even though she may have gone through other courses of domestic economy. The tone of the book is so healthy and affectionate, that we are delighted to highly recommend it to all interested in the welfare of our country.

The Compendious English Grammar, preceded by a Sketch of the History of the English Language. Blackie and Son.

The author, or authors, of this admirable work have not published their names, but, whoever he, she, or they may be, certain it is, a very valuable book has been given to the world, and one which ought to make its way into other schools, etc., than those under Government inspection.

The short preface tells us that it has been prepared as an enlargement of the Elementary Grammar in the Comprehensive Series of School Books; but we may assure those thinking of purchasing it that it requires no preparatory work, as it begins with the very rudiments of the subject.

The historical sketch of the language, contained in only fifteen pages, is really, for its length, a mass of information, compiled in a most interesting way, concluding with the same passage of the Bible, printed side by side, in four columns, showing the differences and growth in the language, from the Anglo-Saxon Version of 1000 to the Authorised Version in 1611, the other two versions being that of Wiclif (1380) and Tyndale's (1526). In the last three of these, all words other than of Saxon origin are printed in bold type, showing what a small fraction they form of the words in our language.

We are delighted to see that the changes the mutes undergo, when meeting in composition, are classified and explained.

There are also in this first part, on orthography, other rules as to spelling, with lists, more or less complete, of exceptions.

In the lists of affixes and prefixes, though the meaning of the Latin and Greek prepositions are given, we are sorry to see no attempt is made to account for some of the English affixes, as -ness, -en, -ar, -yer, -th. Philologists, we know, are very divided about some of them; but we cannot help thinking something might have been said about such words, for instance, as 'hood' and 'ness,' especially as they are so often asked for in higher examinations. There are no less than 490 Latin and 205 Greek words given, from which English words are derived.

There are also thirty-two pages of exercises at the end of the book, some of which, printed full of mistakes, are to be corrected, a useful method for cultivating the perceptives.

There are no entire examination papers as recently given, but, before the exercises, there is a fair number of questions selected from those set for the Queen's Scholarships.

The book is well bound, clearly printed, important words being made prominent by bolder type, and only costs 1s. 6d. We heartily commend it.

Outlines of the World's History, Ancient, Mediæval, and Modern. By Edgar Sanderson, M.A. Blackie and Son.

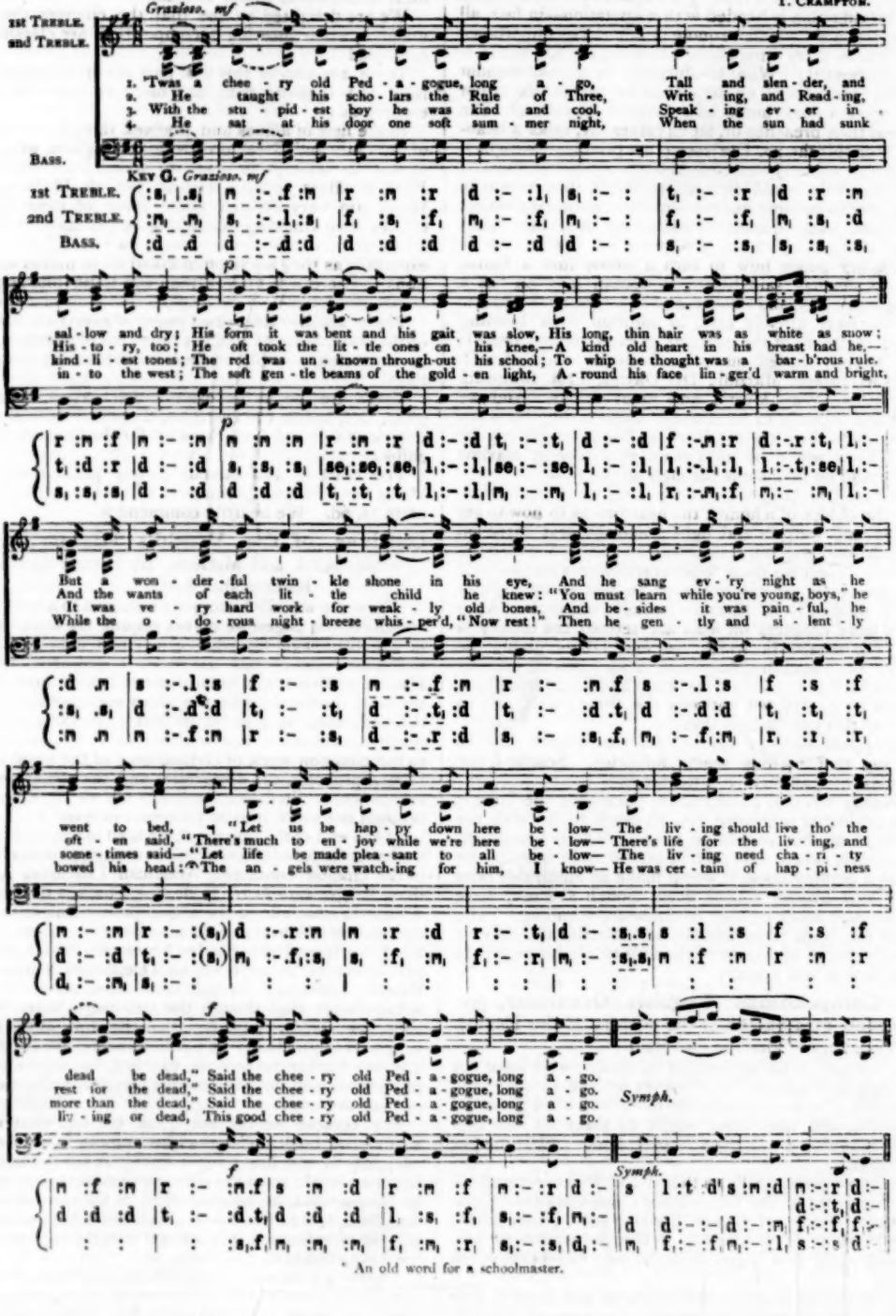
When the world's history is contained in a well-printed volume of 664 pages, we do not require the word 'outlines' in the title-page, for what else could it be? The said title-page tells us that the work is prepared with the special relation to the history of civilisation and the progress of mankind; and the short preface enlarges upon this somewhat, by assuring us that it 'includes an account of the contributions made by the chief peoples of the world to the common stock of civilisation; of the great steps in human progress, the discoveries and the achievements in art, science, literature, politics, and war, which have brought the world into its present condition.'

At the end of the volume there is an index, and, as far as we have compared it, a very full one—*e.g.*, on pages 625, 626, in the chapter containing American Literature and Art, there is a paragraph on E. A. Poe, which is duly indexed. To test to what extent the above promise, as to recording the modern achievements in art, science, war, etc., was fulfilled, we turned to the index for certain things, but it did not direct us to anything on Telephones, Torpedoes, or Electric Lighting. At the same time, we are bound to acknowledge that though the title-page bears the date 1885, we see, on page 640, that the story of the book is supposed to conclude with Stanley's search for Livingstone, and his further travels up to 1877, by which time the aforementioned discoveries were certainly not as advanced as they are now.

We confess we do not quite see for what class of readers or book collectors this volume is intended. It certainly is not fitted for a text-book for schools. Very few men would have the courage to sit down to read it as an amusement, as, necessarily, it is far too full of facts, and those told in the fewest possible words; and as simply a book of reference it is not sufficiently copious, nor, as we have shown, up to date.

There are several maps, which are clearly drawn, and the work is very fairly illustrated with portraits and sketches more or less authentic. The binding and printing, and, we may add, price (6s. 6d.), are all in Messrs. Blackie's usual liberal style.

THE CHEERY OLD PEDAGOGUE.*

T. CRAMPTON.

1st TREBLE.
2nd TREBLE.
BASS.
Grazioso. mf
1. 'Twas a chee - ry old Ped - a - gogue, long a - go, Tall and slen - der, and
2. He taught his scho - lars the Rule of Three, Writ - ing, and Read - ing,
3. With the stu - pid - est boy he was kind and cool, Speak - ing ev - er in
4. He sat at his door one soft sum - mer night, When the sun had sunk
KEY G. Grazioso. mf
sal - low and dry; His form it was bent and his gait was slow, His long, thin hair was as white as snow;
His - to - ry, too; He oft took the lit - tle ones on his knee,—A kind old heart in his breast had he,—
kind - li - est tones; The rod was un - known through-out his school; To whip he thought was a bar - b'rous rule.
in - to the west; The soft gen - tle beams of the gold - en light, A - round his face lin - ger'd warm and bright,
But a won - der - ful twin - kle shone in his eye, And he sang ev - 'ry night as he
And the wants of each lit - tle child he knew: "You must learn while you're young, boys," he
It was ve - ry hard work for weak - ly old bones, And be - sides it was pain - ful, he
While the o - do - rous night - breeze whis - per'd, "Now rest!" Then he gen - tly and si - lent - ly
went to bed, "Let us be hap - py down here be - low— The liv - ing should live tho' the
oft - en said, "There's much to en - joy while we're here be - low— There's life for the liv - ing, and
some - times said— "Let life be made plea - sant to all be - low— The liv - ing need cha - ri - ty
bowed his head: "The an - gels were watch - ing for him, I know— He was cer - tain of hap - pi - ness
dead be dead," Said the chee - ry old Ped - a - gogue, long a - go.
rest for the dead," Said the chee - ry old Ped - a - gogue, long a - go.
more than the dead," Said the chee - ry old Ped - a - gogue, long a - go.
liv - ing or dead, This good chee - ry old Ped - a - gogue, long a - go.
Symph.

* An old word for a schoolmaster.

Pupil Teachers' Examination Papers,

WITH ANSWERS.

FIRST YEAR.

Pupil Teachers at end of First Year.

Three hours and a half allowed.

Arithmetic.

MALES.

1. Find the diff. between

$$\frac{3\frac{5}{6}-(\frac{5}{6}+\frac{3}{4})}{3\frac{5}{6}-(\frac{5}{6}-\frac{3}{4})} \text{ and } \frac{3\frac{5}{6}-\frac{5}{6}+\frac{3}{4}}{3\frac{5}{6}-\frac{5}{6}-\frac{3}{4}}.$$

$$\frac{3\frac{5}{6}-(\frac{5}{6}+\frac{3}{4})}{3\frac{5}{6}-(\frac{5}{6}-\frac{3}{4})}, \quad \frac{3\frac{5}{6}-\frac{5}{6}+\frac{3}{4}}{3\frac{5}{6}-\frac{5}{6}-\frac{3}{4}}$$

(L. C. M. = 12)

$$=\frac{46-(10+9)}{46-(10-9)}, \quad \frac{46-10+9}{46-10-9}$$

$$=\frac{27}{35}, \quad \frac{45}{27}$$

$$=\frac{81,225}{135}$$

$\therefore$ Diff. $=1\frac{90}{135}$

$=1\frac{2}{15}$. Ans.

2. Write the following fractions in decimal form and place them in the order of magnitude, greatest first; $\frac{7}{9}$, $5\frac{4}{5}$, $\frac{18}{11}$, $2\frac{1}{10}$, $\frac{8}{2\frac{1}{2}}$.

$\frac{7}{9}=\cdot 7\dot{7}$

$5\frac{4}{5}=5\cdot 4$

$\frac{18}{11}=1\cdot\dot{6}\dot{3}$

$2\frac{1}{10}=2\cdot 056\ldots$

$\frac{8}{2\frac{1}{2}}=\frac{8\cdot 2}{2\cdot 5}=3\cdot 2$

Order of magnitude, $\frac{18}{11}$, $5\frac{4}{5}$, $\frac{8}{2\frac{1}{2}}$, $2\frac{1}{10}$, $\frac{7}{9}$. Ans.

3. Find the value of $\cdot 4$ of 3s. 9d. + $\cdot 27$ of a guinea − $\cdot 02\dot{3}$ of £10·$\dot{3}\dot{3}$, and reduce the result to fraction of half a crown.

$\cdot 4$ of 3s. 9d. + $\cdot 27$ of a guinea − $\cdot 02\dot{3}$ of £10·$\dot{3}\dot{3}$

$=\frac{4}{10}\times\frac{45}{1}+\frac{27-2}{90}\times\frac{252}{1}-\frac{23-2}{900}\times\frac{20}{1}\times\frac{240}{1}$

$=20+70-57\frac{12}{15}$

$=32\frac{3}{15}$

$=$ 2s. $8\frac{3}{15}$d. Ans.

$\frac{482}{15}$

2s. $8\frac{3}{15}$d. $=\frac{15}{30}=\frac{8\frac{1}{2}}{30}=1\frac{15}{482}$. Ans.

4. A, B, and C can do a piece of work in 8 days. A is able to do it in 20 days, and C in 24 days. What fraction of the whole can B do in 3 days?

A, B, and C can do $\frac{1}{8}$ in 1 day.
A ,, $\frac{1}{20}$,,
C ,, $\frac{1}{24}$,,
A and C ,, $\frac{1}{20}+\frac{1}{24}=\frac{11}{120}$ in 1 day.
B ,, $\frac{1}{8}-\frac{11}{120}=\frac{4}{120}=\frac{1}{30}$ in 1 day.
$\therefore$ B ,, $\frac{1}{30}\times 3=\frac{1}{10}$ in 3 days. Ans.

FEMALES.

1. Find, by practice, the cost of 1 ton 14 cwt. 32 lbs., at £714 2s. 0½d. per ton.

	£	s.	d.	
10 cwt. = ½ ton.	714	2	0½	= value of 1 ton.
4 cwt. = ⅖ ton.	357	1	0½	= ,, 10 cwt.
28 lbs. = $\frac{1}{20}$ of 4 cwt.	142	16	$4\frac{10}{20}$	= ,, 4 ,,
4 lbs. = ⅐ of 28 lbs.	8	18	$6\frac{4\cdot 5}{20}$	= ,, 28 lbs.
	1	5	$6\frac{16}{20}$	= ,, 4 ,,
	£1224	3	6	= ,, 1 ton, 14 c. 32 lbs.

2. Make out a bill for the following articles :—

6 yards cambric at 1s. 5½d. per yard.
1¼ ,, silk at 4s. 9½d. per yard.
96 collars at 2s. 1½d. per doz.
15 yards fringe at 7¾d. per yard.
1½ doz. buttons at 7½d. each.
3 pairs stockings at 3s. 9½d. per pair.

Sherborne,
July 16th, 1885.

Mrs. Pooley,
Bought of Dingley and Sons.

	£	s.	d.
6 yards cambric at 1s. 5½d. per yard ...	0	8	7½
1¼ yards silk at 4s. 9½d. per yard ...	0	7	2¼
96 collars at 2s 1½d. per doz. ...	0	16	10
15 yards fringe at 7¾d. per yard ...	0	9	8¼
1½ doz. buttons at 7½d. each	0	9	8½
3 pairs stockings at 3s. 9½d. per pair...	0	11	3½
	£3	3	4

3. By how much is $\frac{3}{7}$ of $\frac{2}{5}$ of $\frac{1}{12}$ greater than $\frac{2}{7}$ of $\frac{3}{5}$ of $\frac{1}{12}$?

$=\frac{3}{35}-\frac{1}{70}$

$=\frac{3-2}{12}$

$=\frac{1}{12}$. Ans.

4. Find the dividend on shares worth £566 19s. 3d. at 10s. 11½d. per pound.

10s. = ½ £
6d. = $\frac{1}{20}$ of 10s.
4d. = $\frac{1}{30}$ of 10d.
1½d. = ⅓ of 6d.

£	s.	d.		
566	19	3	= Div. at £1 in the £	
283	9	$7\frac{1}{2}$	= ,, 10s.	,,
14	3	$5\frac{11}{20}$	= ,, 6d.	,,
9	8	$11\frac{11}{60}$	= ,, 4d.	,,
3	10	$10\frac{7}{180}$	= ,, 1½d.	,,
£310	12	$11\frac{113}{180}$	= ,, 10s. 11½d. Ans	

Grammar.

MALES AND FEMALES

'Tis good to speak in *kindly* guise,
And *soothe where'er* we *can* ;
Fair speech *should bind* the human mind,
And love *link* man to man.

1. Analyse the above passage.
2. Parse the words in italics.

ANALYSIS.

Sentence.	Kind of Sentence.	Con.	Subj.	Pred.	Object.	Exten.
(*a*) 'Tis good to speak in kindly guise	Princ Sent.		It, to speak in kindly guise	is good		
(*b*) and soothe	Prin. Sent.	and	[it] to soothe	[is good]		
(*c*) where'er we can	Adv. Sent. to (*b*)	where'er	we	can [soothe]		
(*d*) fair speech should bind the human mind	Prin. Sent.		fair speech	should bind	the human mind	
(*e*) and love link man to man	Prin. Sent	and	love	[should] link	man to man	

'Tis = it is.

2. *It*—pers. pro., neut., sing., 3rd, nom. to *is*.
is—irreg. intrans. verb, act., ind., pres., 3rd, sing., agreeing with *it*.
good—adj. of quality, qualg *it*.
kindly—adj. of quality, qualg. *guise*.
soothe—reg. trans. verb (used intransly.), inf. mood, used as verbal noun, neut., sing , 3rd, nom. in app. with *it*.
where'er—advl. conj., joining the two sents., 'It is good to soothe' and 'We can soothe.'
can—aux. verb to *soothe*, irreg. intr., indg. potential mood, present tense.
should—aux. verb to 'bind,' irreg. intrans, indg. potential mood, past tense.
bind—irreg. trans. verb, act., inf., pres., gov. by 'should.'
should bind—irreg. trans. verb, act., pot., past, 3rd, sing., agr. with *speech*.
link—reg. trans. verb, act., inf., pres., gov. by *should*, und.

3. Point out and give the meaning of the affixes in the following English words. Give two other examples of words with similar terminations:—

Manly, lawless, mighty, hopeful, ninety, leaden, southern, darken, hither, here.

Word.	Affix.	Meaning.	Other Examples.
Manly	-ly	like	masterly, heavenly
Lawless	-less	without	houseless, hopeless
Mighty	-y	pertaining to	healthy, wealthy
Hopeful	-ful	full of	wonderful, thankful
Ninety	-ty	ten times	sixty, seventy
Leaden	-en	made of	wooden, golden
Southern	-ern	direction	eastern, western
Darken	-en	to make	deaden, weaken
Hither	-ther	direction	thither, whither
Here	-ere	place	there, where

4. Define 'Transitive' and 'Intransitive' Verbs.
Show that the same verb may sometimes be one and sometimes the other, according to the sense in which it is used.

A Transitive Verb is a word which denotes an action which passes over from the agent to the object.
An Intransitive Verb denotes an action complete in itself, and which does not require an object.
Transitive verbs may be used intransitively, and intransitive verbs may be used transitively, *e.g.*:—

The bird sings (Intrans.)—The bird sings a song (Trans.).
The man opened the tin (Trans.)
The earth opened suddenly (Intrans.).
The butcher weighs the meat (Trans.).
The meat weighs ten ounces (Intrans.).
Mary ran into the house (Intrans.).
John ran the pony round the lake (Trans.).

Geography.

Answer two questions, one of which must be Question 1.

1. Draw a map of one of the following:—
   (*a*) Ireland.
   (*b*) England, from the Mersey to the Isle of Wight.
   (*c*) Canada Proper, Nova Scotia, and New Brunswick.

2. Compare Australia and Canada as suitable countries for emigrants, and give the chief physical features of the former colony.

Both Australia and Canada offer considerable attractions to emigrants who are industrious and willing to adapt themselves to new circumstances and new modes of life. Agriculture forms the staple industry of both provinces, but in Australia the crops are wheat, cotton, sugar, and the vine, whereas the cereals grown in Canada are principally wheat and maize. The emigrant to Canada must be prepared to experience a greater degree of cold and a longer winter than in this country; while the emigrant to Australia, especially to Queensland, must be prepared for a greater amount of heat than he had in England. Both countries have a fertile soil, which produces good crops, but Australia has the disadvantage of sometimes suffering from drought.
Australia, except in the south-east, is very flat, the only ranges of mountains running parallel with the east coast.
The Australian Alps, the Blue Mts., and the Liverpool Range are names given to various parts of the chain. The different stretches of slightly upland country west of the ranges receive in different parts the names of Liverpool Plains, Bathurst Plains, Brisbane Plains, Darling Downs. Australia has few rivers, the Murray, with its tributaries, Lachlan, Darling, and Murrumbidgee being the only one of importance. Lake Torrens is only a great swamp. The coast of Australia is almost unbroken.

3. Write a description of a tour through the Highlands and Islands of Scotland.

Starting from Glasgow by steamer, it is possible to visit most of the lochs and islands on the West coast. The principal of these in the Firth of Clyde are the Gareloch, Loch Long, Loch Fyne. Sailing down the Clyde we pass Bute and Arran, the former beautifully wooded and fertile, the latter mountainous and rugged. After rounding the Mull of Cantyre we near Jura and Islay, the conical peaks of the former standing out boldly against the sky. Numerous small islands dot the ocean as we sail northwards towards Oban, a central town from which to visit the West coast. Leaving Oban, we sail round the island of Mull, famous for its basaltic rocks and its breezy downs, and call at Staffa to see the famous Fingal's cave, and at Iona to see the remains of the ancient cathedral and the burying-place of so many Scottish kings. The coast north of this is extremely rugged and indented. Rum, Eig, and other islands are left behind, and we reach Skye with its Cuchullin Hills and Quairaing. From Skye we visit the bare outer Hebrides, Lewis, and N. and S. Uist. N.E. of these we pass to the Orkneys and Shetlands. Leaving the boat at Wick by the Highland Railway we pass through the Northern Highlands and reach Inverness. The whole range of the Grampians lies parallel to the Caledonian Canal, down which we sail, and passing Ben Nevis, the highest mountain in Scotland, we again near Oban. Thence by rail we pass Ben Lawers, Ben More, Ben Cruachan, and others of the principal heights, before reaching Callander in Perthshire. Going westwards through the Trossachs, we sail along Lochs Katrine and Lomond, and see Ben Venue and Ben Lomond, and by rail reach Glasgow, whence we started.

History.

1. State what you know concerning the Saxon invaders of Britain.

The Saxon invaders of Britain inhabited the district round the mouth of the Elbe from the Rhine to the Weser, including the peninsula of Jutland. They consisted of four tribes, the Jutes, Angles, Saxons, and Frisians. They were noted for their bravery and their warlike propensities. During the Roman occupation they effected a landing on the Eastern coast, but the first recorded instance of their coming to Britain was in 449, when Vortigern, of Kent, sought the aid of Hengist and Horsa, two pirates of the Saxon race, against the Picts and Scots. The Saxons were idolaters. They worshipped the sun, moon, and gods under the names of Tui, Woden, Thor, Friga, and Saterne, Woden being the most venerated. They submitted to a king of their own choice, who was the commander of their armies, the fountain of honour and justice, and the guardian of the rights and privileges of the people. They established among themselves forms of government which were the germs of our present Constitution. The power of the government was vested in the king and a council called the Witan, consisting of the prelates, abbots, ealdormen, and wise men of the kingdom. Their modes of trial were compurgation, ordeal, and combat, and their punishments the infliction of fines or death.

2. What led to the Danish occupation of Britain?

From the end of the eighth century to the beginning of the eleventh, England had been troubled at various periods by incursions of the Danes, but upon the accession of Ethelred the Unready they appeared with renewed vigour. Instead of meeting them boldly, Ethelred attempted to buy them off, but without success, so a general massacre was ordered, which took place in 1002. Among the slain was the sister of Sweyn, King of Denmark, who made repeated reprisals upon the English. In 1013 he was so successful that London and the whole of the South submitted to him, and he became king. He died soon after, but his successes were followed up by Canute his son, who reigned from 1016 to 1035.

3. Describe generally the condition of England under the Saxon rulers.

England for a time, after the departure of the Romans, was in a disturbed and retrograde condition. The Britons had become peaceable and industrious, and were unable to cope with their ferocious enemies from the north. After the first three hundred years considerable improvements had been made, the whole country, excepting Wales and Cornwall, had been peopled, and the government had become somewhat settled. The incursions of the Danes broke the continuity of the progress, and the incompetency of Ethelred led to the supremacy of the Danes. So great, however, had the national life been affected by the Saxons, that their laws, forms of government, and language have effectually resisted all subsequent changes, and form the basis of the national life at the present time. The Saxons themselves were converted from Paganism to Christianity, and made great progress in the arts of civilized life. Agriculture flourished, architecture and building were improved, and every indication given of substantial national and moral progress.

Composition.

Write from memory the substance of the following story:—
A Russian labourer, who had deposited in a purse-skin which he wore at his breast the hard-earned savings of his life, was

murdered by two of his companions for the sake of the little treasure. The murderers escaped to a neighbouring forest, but were followed by two dogs belonging to the deceased, which would on no account quit them. The two men did everything they could to appease the animals, but in vain. They then tried to kill them, but the dogs were on their guard and kept out of reach, but continued to howl dreadfully. Reduced to despair, the two men after several days returned to the village and gave themselves up to justice.

Needlework.

FEMALES.

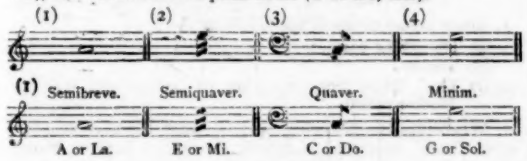
(One hour will be allowed for this exercise in the afternoon.)

Music.

OLD NOTATION.

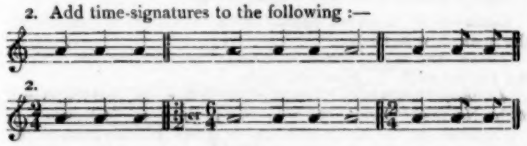
A quarter of an hour allowed for this paper.

(N.B.—Pupil Teachers may answer the questions in either the Staff Notation or the Tonic Sol-fa, but *not both*. The questions in the Tonic Sol-fa Notation will be found at the end.)

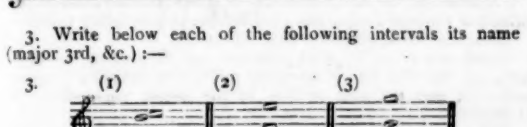
1. Write above each of these notes its value-name (crotchet, &c.), and below each its pitch-name (C or Do, &c.).

(1) Semibreve. Semiquaver. Quaver. Minim.

A or La. E or Mi. C or Do. G or Sol.

2. Add time-signatures to the following :—

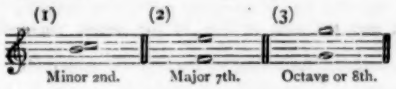


2.



3. Write below each of the following intervals its name (major 3rd, &c.) :—

3. (1) (2) (3)



Minor 2nd. Major 7th. Octave or 8th.

TONIC SOL-FA NOTATION.

1. Write out the different measures used in Tonic Sol-fa, and name them :—

1. | : | Two-pulse measure.

| : : | Three-pulse measure.

| : | : | Four-pulse measure.

| : : | : : | Six-pulse measure.

| : : | : : | : : | Nine-pulse measure.

2. Write the names of the following intervals:—(1) *te* to *doh'*; (2) *fah* to *me'*; (3) *soh* to *soh'*.

2. (1) Minor 2nd ; (2) Major 7th ; (3) Octave or 8th.

3. Write the following an octave lower. How would you know what pitch to make the *doh* if asked to sing it?

KEY F.

|d :m' :d' |r' :m' :f' |t :d' :l |s :d :d' |

3.

KEY F.

|d :m :d |r :m :f |t_1 :d :l_1 |s_1 :d_1 :d |

The words "Key F" show that the sound called "F" is to be obtained from the tuning-fork, and called *doh*.

SECOND YEAR.

Pupil Teachers at end of Second Year.

FIRST PAPER.

Three hours and a half allowed.

Euclid.

MALES.

[All generally understood abbreviations for *words* may be used, but not symbols of operation as −, +, ×.]

(*Answer two questions, including No. 3 if you can.*)

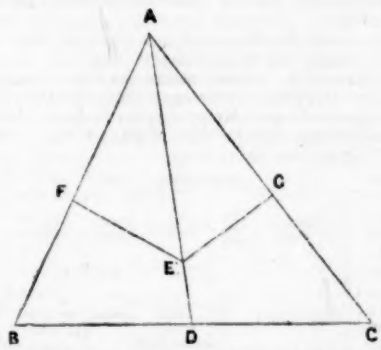
1. The angles at the base of an isosceles triangle are equal, and if the equal sides be produced the angles on the other side of the base shall be equal.

Euclid, Book I., Prop. 5.

2. If from the ends of a side of a triangle there be drawn two straight lines to a point within the triangle, these two straight lines shall together be less than the other side of the triangle, but shall contain a greater angle.

Euclid, Book I., Prop. 22.

3. ABC is a triangle, of which the angle BAC is bisected by the straight line AD. From E in AD perpendiculars are let fall to AB, AC respectively. Show that they are equal to each other.



Let the straight line AD bisect the ∠ BAC of the triangle ABC, and from E in AD let the perpendiculars EF and EG be drawn to AB and AC respectively.

Then EF = EG

Because in the two △'s AEF, AEG, the ∠ EAF = ∠ EAG (Const.), and the ∠ EFA = ∠ EGA (Const.) ∴ The two ∠'s EAF, AFE = the two ∠'s EAG, EGA each to each, and the side AE is common to the two △'s. ∴ (I. 26) the △ EAF = △ EAG, and the remaining sides = remaining sides, viz., the side AF = side AG, and the side EF = side EG.

Wherefore, if ABC, etc. Q. E. D.

Arithmetic.

FEMALES.

1. Simplify $\frac{4\frac{5}{12} \div 21\frac{1}{2}}{14\frac{1}{2} \div 5\frac{5}{12}} + 672\frac{3}{264}\frac{11}{11}$.

$$\frac{4\frac{5}{12} \div 21\frac{1}{2}}{14\frac{1}{2} \div 5\frac{5}{12}} + 672\frac{3}{264}\frac{11}{11}$$

$$= (\frac{53}{12} \times \frac{1}{21\frac{1}{2}} \times \frac{29}{65} \times \frac{43}{43}) + 672\frac{3}{264}\frac{11}{11}$$

$$= \frac{53}{516} + 672\frac{3}{264}\frac{11}{11}$$

$$= 672\frac{20 + 211}{264}$$

$$= 672\frac{231}{264}$$

$$= \underline{672\frac{7}{8}}. \quad \text{Ans.}$$

2. *A* received $\frac{1}{2}$ of a cask of wine; *B* received $\frac{1}{3}$ of the remainder, and *C* $\frac{1}{4}$; there were now $\frac{17}{96}$ gal. left in the cask. How much did it contain at first?

Amount received by $A = \frac{1}{2}$

" $B = (\frac{1}{3}$ of $\frac{1}{2}) = \frac{1}{6}$

" $C = \frac{1}{8}$

" *A*, *B*, and $C = \frac{1}{2} + \frac{1}{6} + \frac{1}{8} = \frac{23}{24}$.

Left in cask $= 1 - \frac{23}{24} = \frac{1}{24}$.

$\frac{1}{24} = \frac{17}{96}$ gal.

$\frac{1}{3} = \underline{\frac{17}{96}}$ gal. Ans.

3. Add together $\frac{1}{2}$ of $\frac{1}{3}$ of 5s. 5d., $\frac{1}{3}$ of $\frac{2}{5}$ of 2s. 1d., $\frac{2}{5}$ of $\frac{1}{1\frac{1}{2}}$ of 4s. 2d., and £86 0s. 10$\frac{1}{2}$d.

$$(\tfrac{1}{2}\times\tfrac{1}{3}\times\tfrac{5}{1}^{s})+(\tfrac{1}{3}\times\tfrac{2}{5}\times\tfrac{2}{1}^{s})+(\tfrac{2}{5}\times\tfrac{1}{1\frac{1}{2}}\times\tfrac{4}{1}^{s})+£86\ 0s.\ 10\tfrac{1}{2}d.$$
$$=\tfrac{5}{6}^{s}+\tfrac{4}{15}^{s}+\tfrac{8}{15}^{s}+£86$$
$$=£86+\frac{728+450+700+453}{42}d.$$
$$=£86+2\tfrac{23}{42}d.$$
$$=\underline{£86\ 4s.\ 7\tfrac{1}{2}d.}\quad \text{Ans.}$$

4. Reduce $\frac{3}{7}$ and $2\frac{3}{11}$ to decimal fractions.

$$\tfrac{3}{7}=\tfrac{1}{2}\times\tfrac{1}{7}=\cdot5\div12=\underline{\cdot0416}.\quad \text{Ans.}$$
$$2\tfrac{3}{11}=2\frac{3\cdot1}{9}=\underline{2\cdot34}.\quad \text{Ans.}$$

Grammar.

MALES AND FEMALES.

The wretch *condemned* with life *to part*,
Still, still on hope relies,
And every pang *that* rends the heart
Bids expectation *rise*.
Hope, *like* the glimmering taper's light,
Adorns and cheers the way,
And *still*, *as darker* grows the night,
Emits a brighter ray.

1. Paraphrase and analyse the above passage, parsing the words in italics.

The criminal who has been condemned to death hopes to the very last that mercy may be extended to him, and every fresh symptom of despair by contrast makes the hope stronger and brighter. Just as the light of the taper shines but dimly in the twilight, but seems to grow stronger as the darkness deepens, so hope cheers and brightens the lives of all, gaining strength as the trials of life assume darker shades.

ANALYSIS.

Sentence.	Kind of Sent.	Connective.	Subject.	Predicate.	Object.	Extension.
(*a*) The wretch condemned with life to part, still, still on hope relies	Prin. Sent.		The wretch condemn'd to part with life	relies	on hope (ind.)	still (time)
(*b*) and every pang bids expectation rise	Prin. Sent. co-ord with (*a*)	and	every pang	bids	expectation (dir.) to rise (ind.)	
(*c*) that rends the heart.	Adj. Sent. to *pang* in (*b*)		that	rends	the heart	
(*d*) Hope, like the glimmering taper's light, adorns the way	Prin. Sent.		Hope	adorns	the way	like the glimmering taper's light (manner)
(*e*) and cheers [the way]	Prin. Sent. co-ord. with (*d*)	and	[it]	cheers	the way	
(*f*) and still emits a brighter ray	Prin. Sent. co-ord. with (*d*)	and	[it]	emits	a brighter ray	still (time)
(*g*) as darker grows the night	Adv. Sent. to (*f*)	as	the night	grows dark'r		

Condemned—Past part. of the trans. verb *condemn*, referring to *wretch*.
to part—reg. intrans. verb, act., inf., pres., gov. by *condemned*.
that—rel. pro., agreeing with its antecedent *pang*, neut., sing., 3rd, nom. to *rends*.
rise—irreg. intrans. verb, act., inf., pres., gov. by *bids*.
like—adj., gov. *light*.
still—adv. of time, qualg. *emits*.
as—cop. conj., joining the sents. 'emits a brighter ray,' and 'the night grows darker.'
darker—adj. of quality, compar. deg., qualg. *night*.

2. Write three words as examples of the use of the following prefixes:—per, post, circum, un, re, retro, trans, abs, in, con.

per—permit, pertain, perforce.
post—postpone, post-date, post-mortem.
circum—circumscribe, circumvent, circumference.
un—unbind, unloose, unbend.
re—reform, retrace, review.
retro—retrospect, retrograde, retrogression.
trans—transgress, transplant, transform.
abs—abstain, abstract, abstinence.
in—invalid, inflict, infuse.
con—conform, conflict, confuse.

3. Give the meaning of the following Latin affixes, and examples of their use:— *-ine*, *-eous*, *-ior*, *-nce*, *-ple*, *-ble*, *-ite*, *-it*.

-ine, belonging to, as feline, divine.
-eous, full of, made of, as ligneous, vitreous, igneous.
-ior, comparative ending, as inferior, superior.
-nce, forms abstract nouns, as distance, consistence.
-ple, fold, as multiple, triple.
-ble, fold, as double, treble.
-ite, belonging to, as favourite, Israelite.
-it, forming verb, as debit, credit.

Geography.

[Answer one question, and draw one map.]

1. Draw a map of one of the following:—
(*a*) The Rhine basin.
(*b*) Turkey.
(*c*) The Black Sea, showing its connection with the Mediterranean.

2. Where are the following, and for what are they noted:—Cadiz, Turin, Archangel, Leghorn, Matapan, Leyden, Varna, Cologne, Rouen, Lyons, Florence, Kiev.

Cadiz—S.W. coast of Spain, on bay of Cadiz, the centre of the Spanish wine trade.
Turin—the capital of the Sardinian States, on the left bank of the Po, noted for its great silk trade.
Archangel—on the S E coast of the White Sea, near the mouth of the Northern Dwina, the only port in the north of Russia.
Leghorn—on the Mediterranean, in the N. of Italy, one of the principal ports of Italy; has considerable ship-building trade.
Matapan—most southerly point of Greece.
Leyden—midway between Haarlem and Rotterdam, in Holland, on the Old Rhine, about six miles from the sea; of great antiquity, and the seat of one of the oldest universities of Holland.
Varna—on the Black Sea, in Turkey, a considerable port and fortress.
Cologne—on the Rhine in Rhenish Prussia, noted for its manufactures and commerce; eau-de-Cologne is exported largely.
Rouen—seventy miles from the mouth of the Seine, manufacture of cotton.
Lyons—at the junction of the Rhone and the Saone, the centre of the French silk trade.
Florence—on the Arno in N. Italy, noted for its cathedral, pictures, sculptures, etc., once capital of Italy.
Kiev—on the Dnieper in S. Russia, the centre of a large agricultural district.

3. Describe fully the course of the Danube, *or* the Rhine.

(1) The *Danube* rises in a fountain in the courtyard of a castle in the Grand Duchy of Baden, after issuing from which it is joined by two small streams from the eastern slopes of the Black Forest or Schwartz Wald Mountains. It then flows in an easterly direction through Austria, passing Vienna the capital, and Buda-Pesth the capital of Hungary. At the latter town it makes a great bend southward for two hundred miles. It then again flows eastwards, its bed being considerably narrowed as it nears the Carpathian Mountains, and its navigation being considerably impeded by the rocks in the narrow defile called the 'Irongate,' through which it flows into the Black Sea. Its total course is nearly 1700 miles, and the area it drains upwards of 300,000 sq. miles. It receives numerous tributaries in its course; on the right bank the Drave, Save, and Morava, and on the left, the Theiss, Aluta, and the Pruth. It has several mouths.

(2) The *Rhine* rises in a glacier on Mt. St. Gothard, and flows in a northerly direction in a swift current to Lake Constance, into which it pours its waters and a great deal of debris, which is gradually filling up the lake. Leaving the lake it descends nearly 200 feet at Schaffhausen, and flows westward to Basel, where it makes a great bend northward, passing Strasbourg and Cologne, two important German towns. Its course has hitherto been rapid, but it now reaches a level country and flows slowly in a N.W. direction into the N. Sea, after a course of 800 miles, and after having received the waters of the Neckar and the Main on the right bank, and the Aar and Moselle on the left. It has many mouths, and is navigable almost to the falls of Schaffhausen.

SECOND PAPER.

Two hours and a half allowed.

Needlework.

FEMALES.

The needlework specimens will be collected by the Inspector one hour after the distribution of the examination paper.

Arithmetic.

MALES.

1. At the end of five years a sum of money placed out at simple interest at 5 per cent. amounted to £658 15s., what was the sum?

Interest on £100 for 5 years at 5 per cent. = £25
∴ £100 becomes 100 + 25 = £125

£ £ s. £ £
125 : 658 15 :: 100 : 527. Ans.

2. At what rate were sheep bought which sold for 12 guineas at a profit of $22\frac{2}{7}$ per cent.?

£100's worth would sell for £100 + $22\frac{2}{7}$
= £$122\frac{2}{7}$

12 guineas = £$12\frac{3}{5}$

$122\frac{2}{7} : 12\frac{3}{5} :: 100 : x$

$\frac{856}{7} \times \frac{63}{5} \times \frac{1}{1200}$

= £10 5s. Ans.

3. A man transfers £5500 invested in the 3 per cent. stock at 92 to the $4\frac{1}{2}$ per cents. at $101\frac{1}{4}$. Find the alteration in his income. (Omit brokerage.)

First income $= \frac{5500 \times 3}{92} = \frac{16500}{92} =$ £$179\frac{22}{23}$

Second income $= \frac{5500 \times 4\frac{1}{2}}{101\frac{1}{4}} = \frac{11000}{1} \times \frac{17}{4} \times \frac{8}{809}$

$\frac{1587000}{6809} =$ £$231\frac{1281}{6809}$

Diff. = £$231\frac{1281}{6809}$ − £$179\frac{22}{23}$ = £$51\frac{14823}{156607}$. Inc. Ans.

4. The difference between the discount and interest on a certain sum of money for three months reckoned at 4 per cent. is 1s.: what is the principal?

Interest on £100 for 3 months at 4 per cent. = £$1\frac{1}{2}$
Discount " " " =

$100\frac{3}{4} : 1 :: £100 : \frac{4}{103}$

Diff. = $\frac{3}{4} - \frac{4}{103} =$ £$\frac{293}{412}$

Amount of principal to produce £$\frac{293}{412}$ diff. = 100

" " " £$\frac{1}{200}$ =

$\frac{293}{412} : \frac{1}{200} ::$ £100 : £285. Ans.

History.

MALES AND FEMALES.

1. What led to the imprisonment of Mary, Queen of Scots, in England, and to her execution?

Mary was the nearest heir to the English throne, being the granddaughter of Henry VIII.'s eldest sister, Margaret. She had taken the title of Queen of England when in France. She laid herself open to charges of gross crimes in Scotland, and the Scottish Lords forced her to abdicate in favour of her son, James VI. They also placed her in captivity, from which, however, she escaped, and, flying to England, she threw herself on the protection of Elizabeth. She was instead detained as a prisoner, and in this position became a source of danger to Elizabeth, for several conspiracies were formed to release her and put her on the throne. One of these, led by Anthony Babington, was discovered. A law of 1585 had provided for the trial of any claimant to the throne by a commission of peers and judges. Before such a commission Mary was tried and found guilty, and in pursuance of the sentence she was beheaded at Fotheringay Castle, Feb. 8, 1587.

2. What was the general condition of the English people under Norman rule?

The Norman Conquest reduced the condition of the majority of the English people to that of serfdom. The land was divided among the followers of William, who built castles for themselves and smaller houses for their retainers. The churl, or small landowner, became a *villein* bound to the soil he tilled, and unable to change his abode at will. The natural characteristics of the Saxon, however, in course of time began to exert themselves. Contact with the Normans, who were frugal and temperate in their habits, gradually lessened the grossness of that of the Saxons. The language of the Saxons, who were more numerous than the Normans, became intermingled with that of the conquerors; the hardihood and daring of the Saxons were appreciated by the kings, who found it to their interest gradually to lessen the severities with which the conquered nation had been treated, a charter of liberties was granted by Henry I., trade and commerce were encouraged, and England and the English ultimately gained by the Norman occupation.

3. Write an account of the Wars of the Roses, their causes, and the ultimate result.

The 'Wars of the Roses' were so called from the badges of the contending parties, York and Lancaster. They arose out of the rival claims of these two houses, the Duke of York contending that he had a prior right to the throne as being descended from an elder son of Edward III. They were carried on for thirty years with varying success from 1455 to 1485, twelve battles being fought in that period, during which a great part of the nobility of the country was destroyed. The battles were:—

St. Alban's	1455, 1461
Bloxhead	1459
Northampton...	1460
Wakefield	1460
Mortimer's Cross	1461
Towton	1461
Hedgeley Moor	1464
Hexham	1464
Barnet...	1471
Tewkesbury	1471
Bosworth	1485

They ended in the union of the contending parties by the marriage of Henry VII. and Elizabeth, and the chief result was an increase in the power of the king and people, and a decrease in the power of the barons.

Teaching.

Give a list of progressive examples in mental arithmetic for Standard III., with the method you would adopt in introducing each kind.

Standard III. are supposed to know the Multiplication and Division Tables, and Money Tables to 12s. They have to prepare all money-tables, and their mental arithmetic will deal chiefly with money questions, and with some preparation for Standard IV. common weights and measures.

First, give examples in adding and subtracting sums of money, as:—

6d. + 8d. + 10d. + 1s.
3½d. + 4½d. + 9½d. + 2s.
9½d. + 8½d. + 7d. + 2s. 6d.

giving easier examples to those who are not so quick as others.

Next let the shilling tables be learnt, and give practice in adding and subtracting shillings, as—

5s. + 4s. + 6s. − 3s.
17s. + 5s. − 6s. − 4s.

Next add pence and farthings to similar examples.

Then find values of common articles as an introduction to multiplication, as 6 knives at 5d. each, reversing the process for division. Introduce weights and measures terms, as tons, lbs., cwt., miles, yards, feet, in similar examples.

Music.

A quarter of an hour allowed for this paper.

OLD NOTATION.

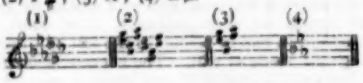
(N.B.—Pupil Teachers may answer the questions in either the Staff Notation or the Tonic Sol-fa, but *not both*. The questions in the Tonic Sol-fa Notation will be found at the end.)

1. Write below each of the following intervals its **name** (minor 2nd, &c.):—

1.

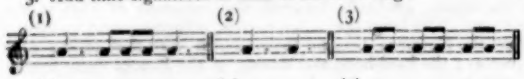
2. Write the key-signatures of the following major keys:—(1) G♭; (2) F♯; (3) A; (4) E♭.

2 (1) (2) (3) (4)

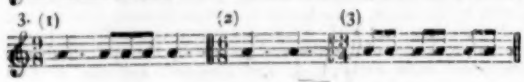


3. Add time-signatures to each of the following:—

(1) (2) (3)



3. (1) (2) (3)



TONIC SOL-FA NOTATION.

1. What are the names of the following intervals:—(1) *le* to *ray*[1]; (2) *soh* to *ma*[1]; (3) *bah* to *te*.

1. (1) Minor or imperfect 4th; (2) Minor 6th; (3) Perfect 4th.

2. Distinguish between the mental effects of *soh*, *te*, and *doh*.

2. *Soh* produces a bold, or grand effect; *te*, a piercing or sensitive effect; and *doh*, a strong, solid, or firm impression.

3. Write a nine-pulse tone, using three-pulse measures.

3. |1 :- :- |- :- :- |- :- :- |

THIRD YEAR.

Pupil Teachers at end of Third Year.

FIRST PAPER.

Three hours and a half allowed.

Euclid.

MALES.

[All generally understood abbreviations for words may be used, but not symbols of operation, such as −, +, ×.]

(*Answer two Questions, including No. 3, if you can.*)

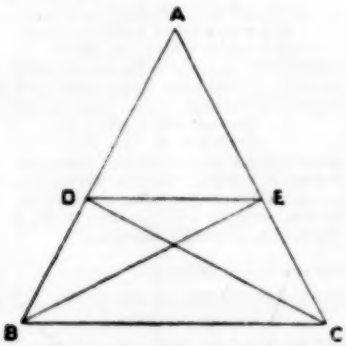
1. To describe a parallelogram equal to a given rectilineal figure, and having an angle equal to a given rectilineal angle.

Euclid, Book I., Prop. 45.

2. Parallelograms upon the same base and between the same parallels are equal to one another.

Euclid, Book I., Prop. 35.

3. Prove that the straight line which joins the middle points of two sides of a triangle is parallel to the base.



Let ABC be a triangle, and D and E the middle points of the sides AB and AC respectively.

Join DE. Then DE is parallel to the base BC. Join BE, CD.

Then ∵ the △'s AED and BED are upon equal bases, AD BD, (Hyp.) and between the same parallels, AB and E, the △AED = △BED. (I. 37.)

In like manner the △CDE = △AED.

∴ each of the △'s BED, CDE = △ADE.

∴ △BED = △CDE (Ax. 1).

Because BDE, CDE are = △'s upon same base DE and upon same side of it, they are between the same parallels (I. 39). Therefore DE is parallel to BC. Q. E. D.

Algebra.

(*Answer two Questions, including No. 1, if you can.*)

1. Write down any formulæ for general results in multiplication you are acquainted with, and apply them to find the results of the following:—

$(x+1)(x-1)(x-2)(x-2)$;
$(a+b+c)(a+b-c)$; $(a+b+c)(a-b-c)$.

Formulæ:— $(a\pm b)^2=(a^2\pm 2ab+b^2)$

$(a+b)(a-b)=(a^2-b^2)$

$(x+1)(x-1)(x+2)(x-2)$
$= (x^2-1)(x^2-4)$
$= \underline{x^4-5x^2+4.}$ Ans.

$(a+b+c)(a+b-c)$
$= \{(a+b)+c\}\{(a+b)-c\}$
$= (a+b)^2-c^2$
$= \underline{a^2+2ab+b^2-c^2.}$ Ans.

$(a+b+c)(a-b-c)$
$= \{a+(b+c)\}\{a-(b+c)\}$
$= a^2-(b+c)^2$
$= \underline{a^2-b^2-2bc-c^2.}$ Ans.

2. Find the G.C.M. of $a^5+a^3x-a^4x^2-a^3x^3$ and $a^6-a^2x^4$.

$a^5+a^3x-a^4x^2-a^3x^3 = a^3(a^2+ax-ax^2-x^3)$
$a^6-a^2x^4 = a^2(a^4-x^4)$

a^2 is the G.C.M. of a^3, a^3.

$a^3+a^2x-ax^2-x^3 \;)\; a^4-x^4 \;(\; a-x$
$a^4+a^3x-a^2x^2-ax^3$
$-a^3x+a^2x^2+ax^3-x^4$
$-a^3x-a^2x^2+ax^3+x^4$
$2x^2 \;|\; 2a^2x^2-2x^4$
a^2-x^2

$a^2-x^2 \;)\; a^3+a^2x-ax^2-x^3 \;(\; a+x$
a^3-ax^2
a^2x-x^3
a^2x-x^3

∴ G.C.M. $= \underline{a^2(a^2-x^3).}$ Ans.

3. Find the value of x in the following equations:—

(1) $2x-\frac{9x+20}{36}=16-\frac{4x-12}{36}-\frac{x}{4}$.

(2) $\frac{x}{2}+\frac{x}{3}+\frac{x}{4}+\frac{x}{5}=77$.

(3) $bx-ac=\frac{a^2x}{b-c}$.

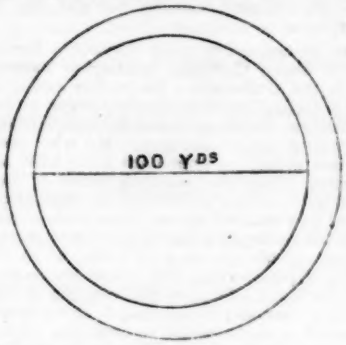
(1) $2x-\frac{9x+20}{36}=16-\frac{4x-12}{36}-\frac{x}{4}$
$72x-9x-20=576-4x+12-9x$
$72x-9x+4x+9x=576+12+20$
$76x=608$
$x=8.$ Ans.

(2) $\frac{x}{2}+\frac{x}{3}+\frac{x}{4}+\frac{x}{5}=77$
$30x+20x+15x+12x=4620$
$77x=4620$
$x=\underline{60.}$ Ans.

(3) $bx-ac=\frac{a^2x}{b-c}$
$bx=\frac{a^2x}{b-c}+ac$
$(b^2-bc)x=a^2x+abc-ac^2$
$(b^2-bc-a^2)x=abc-ac^2$
$x=\underline{\frac{abc-ac^2}{b^2-bc-a^2}}$ Ans.

Mensuration

A circular playground covered with grass, 100 yds. in diameter, has a path on the outside, the area of which is half an acre; find the width of the path.



Area of inner circle of grass
$= 100 \times 100 \times .7854 = 7854$ sq. yds.
Area of outer circle $= 7854 + 2420 = 10274$ yds.
$\therefore \sqrt{10274} \div .7854 = \sqrt{13081.2325}$
$= 114.37$ yds.
$(114.37 - 100) \div 2 = \underline{7.18}\ldots$ yds. Ans.

Arithmetic.

FEMALES.

1. To $\frac{1}{2}$ of a shilling add $\frac{3}{5}$ of half a crown, and reduce the result to the dec. of 7s.

$$\frac{\frac{1}{2}\text{s.} + \frac{3}{5} \text{ of } 2\frac{1}{2}\text{s.}}{7\text{s.}}$$
$$= \frac{\frac{1}{2} + \frac{15}{20}}{7}$$
$$= \frac{\frac{64+75}{80}}{7}$$
$$= \frac{139}{140} \times \frac{1}{7}$$
$$= \frac{139}{980}$$
$$= \underline{.2482}\ldots\ldots \text{ Ans.}$$

2. Divide 1·5 by ·15, ·015, 15, ·00015.

$1.5 \div .15 = \underline{10}$
$1.5 \div .015 = \underline{100}$
$1.5 \div 15 = \underline{.1}$
$1.5 \div .00015 = \underline{10000}$
} Ans.

3. How many yards of matting, 2·5 feet broad, will be required for a room 27 feet long and 6·6 yards broad?

ft. yds. ft.
$2.5 : 6.\dot{6} :: 27 : x$
$= 27 \times 20 \times \frac{3}{5}$
$= 216$ ft. $= \underline{72 \text{ yds.}}$ Ans.

4. Multiply $1.1\dot{1}$ by $.2\frac{3}{7}$, and divide $1.1\frac{5}{7}$ by 5·7.

$$1.1\dot{1} \times .2\tfrac{3}{7}$$
$$= \frac{111 - 11}{90} \times \frac{23 - 2}{90}$$
$$= \frac{100}{9} \times \frac{21}{630}$$
$$= \frac{1}{27}$$
$$= \underline{.25\dot{9}} \text{ Ans.}$$

$$1.1\tfrac{5}{7} \div 5.7$$
$$= \frac{115 - 1}{990} \times \frac{10}{57}$$
$$= \frac{114}{99} \times \frac{1}{57}$$
$$= \frac{2}{99}$$
$$= \underline{.0\dot{2}} \text{ Ans.}$$

Grammar.

1. If *e'er* from me thy loved memorial *part*,
May shame afflict this alienated heart;
Of thee *forgetful* if I form a song,
My lyre be broken, and *untuned* my tongue;
My grief be doubled, *from thy image free*,
And mirth a torment, unchastised by thee.

(1) Name the subordinate sentences in the above passage.
(2) Paraphrase the passage,
(3) Parse the words in italics.

(1) If e'er from me thy loved memorial part—Adv. sent. of condition.
If I form a song, of thee forgetful— do.
If I am from thy image free— do.
If I am unchastised by thee— do.

(2) If I should even cease to remember thee, I hope that a deep sense of shame may trouble by breast; if ever I am forgetful of thy memory, and indulge in mirth and song, may my tongue refuse its office, and my lyre cease to give forth its notes. Nay, let my sorrows be increased, and my joy be a burden when thy image has faded from my memory.

(3) *E'er*—adv. of time, qual. *part*.
may—aux. verb to *afflict*, ind. pot. mood.
shame—abs. noun, neut., sing., 3rd. nom. to *may afflict*.
afflict—reg. trans. verb, act., inf., pres., gov. by *may*.
may afflict—reg. trans. verb, act., pot., pres., 3rd, agreeing with its nom. *shame*.
forgetful—adj. of quality, qualifying *I*.
untuned—adj. of quality, qualifying *tongue*.
from—prep. showing reln. between *image* and *free*.
thy—pers. pro., masc. sing., 2nd, poss., gov. by *image*.
image—com. noun., neut., sing., 3rd, obj., gov. by *from*.
free—adj. of quality, qual. *I* und.

2. Give the affixes in the following words, stating their meaning, and from what language they are derived:—schism, metre, obelisk, sophist, politics, effervesce, crisis, palsy, monarchy, spasm.

schism:	-sm,	G.,	result.
metre:	-tre,	G.,	means of performance of an action.
obelisk:	-isk,	G.,	diminutive.
sophist:	-st,	G.,	agent.
politics:	-ics,	G.,	belonging to.
effervesce:	-esce,	L.,	beginning of an action.
crisis:	-sis,	G.,	action.
palsy:	-sy,	G.,	action.
monarchy:	-y,	G.,	quality.
spasm:	-sm,	G.,	result.

3. What words are of foreign origin in the following lines:—

Through the clear stream the fishes rise,
And nimbly catch the incautious flies.

Clear, incautious.

Geography.

(*Answer two questions, one of which must be a map.*)

1. Draw a map of one of the following:—

(1) India beyond the Ganges.
(2) Arabia.
(3) Asia Minor.

2. Describe South-western Asia.

South-western Asia includes Arabia and Asia Minor.

Arabia comprises a large peninsula, peopled by wandering tribes having few cities, and consisting chiefly of sandy or rocky desert. In the south there is a range of hills, and beyond them the Dalma, a region of sand, and beyond the Dalma, the Nejd, a plateau of sand and rock. At the S.W. of Arabia is Aden, a British station, and on or near the coast of the Red Sea are Yemen, Mecca, and Medina.

At its northern extremity the Red Sea is divided by the peninsula of Sinai into two gulfs—Suez and Akaba. The Isthmus of Suez has been cut for the Suez Canal through a series of lagoons called the Bitter Lakes. The coast of Syria is monotonous till we reach Joppa, whence we can visit Jerusalem, the Jordan, and Damascus, the mountains and cedars of Lebanon, with all the other places mentioned in Scripture. Palestine, however, is now but thinly peopled, and has few remains of its former greatness. Asia Minor is mountainous, the ranges of Taurus and Anti-Taurus crossing it from east to west. Many of its ancient populous places are now destroyed or represented only by miserable villages, Smyrna alone retaining any of its former glory. The islands are numerous, Cyprus, Rhodes, Chio, Mitylene, Tenedos, and Lemnos being the chief. The coast is full of indentations. Scutari, opposite to Constantinople, is the chief town in the north of Asia Minor.

3. What are the chief islands of the Indian Ocean, and the currents which affect its waters.

Madagascar, Mauritius, Bourbon, Seychelles, Socotra, Amirante Is., Bombay, Ceylon, Maldive and Laccadive Isles, Andaman Is., Java, Sumatra, and Penang are the chief islands of the Indian Ocean. Of these Madagascar, Ceylon, and Sumatra are the largest and most important.

The currents of the Indian Ocean are not strongly marked, owing to its comparatively limited surface.

The northern equatorial current flows westward, and on reaching the coast of Africa is divided into two branches, one flowing east of Madagascar, which meets the Antarctic current, flows eastwards and becomes part of the equatorial counter-current in the direct line of steamers to Australia; the other flowing down the west of Madagascar, called the Mozambique current, flows past the Cape of Good Hope as the Agulhas current, and turning northwards becomes part of the equatorial current of the Atlantic Ocean. The monsoons affect and regulate the surface currents of the Arabian Sea and the Bay of Bengal.

SECOND PAPER.

Two hours and a half allowed.

Needlework.

(The Needlework Specimens will be collected by the Inspector at the expiration of one hour after the distribution of the Examination Paper.)

Arithmetic.

MALES.

1. Find the square root of 11·704 to four places of decimals.

$$\begin{array}{r|l} 11\cdot704000 & 3\cdot4211 \text{ Ans.} \\ 9 & \\ \hline 64)270 & \\ 256 & \\ \hline 682)1440 & \\ 1364 & \\ \hline 6841)7600 & \\ 6841 & \\ \hline 68421)75900 & \\ 68421 & \\ \hline 7479 & \end{array}$$

2. In what time will the interest on £1000, if calculated at 5 per cent., be £10 greater than if it were calculated at 4 per ct?

£1000 at 5 per cent. in a year produces $\frac{1000\times5}{100}=£50$

£1000 at 4 " " " $\frac{1000\times4}{100}=£40$

Difference $=£50-£40=£10$.

∴ Time required $=1$ year. Ans.

3. I invest part of £1200 at 5 per cent., and the rest at 4, and thereby obtain as interest £57. Find the sums.

£1200 at 5 per cent. would produce

$$\frac{1200\times5}{100}=£60.$$

£60 is £3 more than actually received, and represents the loss sustained by investing some at 4 per cent.

By investing £100 at 4 per cent. instead of 5 per cent. £1 is lost.

To lose £3 ∴ £300 must be invested at 4 per cent., and £1200 − £300 = £900 to be invested at 5 per cent.

4. Find the compound interest on £1000 for 2 years at 3½ per cent. per annum.

Interest on £1 at 3½ = ·035£

∴ £1000 × ·035 = £35 1st. year's int.

£1000 + 35 = £1035

Interest on £1035 = 1035 × ·035

= £36·225 2nd year's int.

Total Interest = £35 + £36·225

= £71·225

= £71 4s. 6d. Ans.

History.

MALES AND FEMALES.

1. What led to the throne of England being offered to William, Prince of Orange?

State briefly William's character, and what has been said to mar his reign.

James II. determined to make England a Roman Catholic nation. He placed Catholics, contrary to statute, in official positions in the Universities; he publicly attended mass; he published a declaration of indulgence, which he said must be read in churches; he brought seven bishops to trial for presenting a petition against the indulgence, and when they were pronounced 'not guilty,' he determined to do what he wished by force of arms. Then the principal leaders of the Protestant party sent an invitation to William to come and defend the country and Protestantism against James's intentions.

William was distinguished for his power of mind, his energy of character, and his force of will; he was very courageous and of indomitable perseverance. He aimed principally at curbing the power of Louis XIV., and securing the liberty of Protestants. It has been said of him that, to attain these objects, he did not scruple as to the means he employed. The great blots upon his reign are the non-punishment of the authors of the massacre of Glencoe, and the breaking of his promise to the French respecting the revocation of the Edict of Nantes.

2. Who was the last English king who led an army on the field of battle? Give dates and particulars.

War was declared against Spain in 1739, on account of the treatment of the English traders to the West Indies. The war eventually merged into the War of the Austrian Succession. In 1740 Charles VI. died, leaving his throne to Maria Theresa, but the Elector of Bavaria claimed Austria, and Frederick the Great of Prussia, Silesia. France, to weaken Germany, aided Bavaria, and England sent aid to Maria Theresa. The English and French, although not at war with each other, thus helped opposing forces. The Earl of Stair had charge of the English forces, and allowed himself to be cut off from his supplies by the French. King George arrived to find this condition of affairs, and through a mistake of the French commander the British on retreating were compelled to attack the French, and, led by King George, defeated them at Dettingen, 27th June, 1743. The Treaty of Worms was signed immediately afterwards.

3. Name some important discoveries and inventions of the reign of George II.

In 1738 Kaye invented the shuttle.
" 1739 Coal gas was discovered.
" 1740 The smelting of iron by coal instead of charcoal was commenced.
" 1748 Brass foundries were established at Birmingham.
" 1759 Ironworks were established in Stirlingshire.
" 1742 Silver plating was begun at Sheffield.
" 1758 The thrashing machine was invented, and various improvements in agriculture were made during the reign.

Teaching.

Write notes of a lesson on 'Coal Gas.'

Introduction.—Speak of different methods of lighting houses—fires, candles, lamps, gas. Call attention to fire with coal placed upon it. As soon as broken, gas escapes and takes fire, makes a flame. Presence of gas in mines of coal known many years before manufacture of gas attempted.

Method of Manufacture.—[Draw sketches of parts of works as lesson proceeds.] Heat drives away gas, which can be collected. Coal placed in *retorts* by means of long *scoops*, door affixed and made air-tight, fire underneath retort causes *distillation*: gas escapes by a tube in mouth of retort, together with *tar* and *ammoniacal liquor* (explain and show if possible); substance left called *coke*. These substances are chiefly left in a large collecting pipe connected with the retorts; gas carried through bent tubes called *coolers*; thence to *purifiers* filled with dry lime on shelves, the gas passing through perforations in the shelves from one purifier to the other, till free from noxious ingredients, to *gasholder*. Pipes laid from gasholder to houses, which are thus supplied.

Uses of gas.—Lighting, heating, driving engines and machines, cooking; in manufactures. Other products—tar, ammonia, used in arts and manufactures, for dyes, etc.

Dangers of coal gas.—Explosive nature, especially when mixed with air. Carefulness to be enforced.

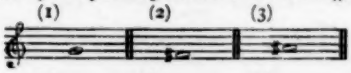
Music.

OLD NOTATION.

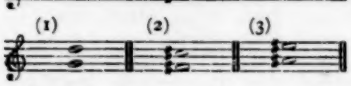
A quarter of an hour allowed for this paper.

(N.B.—Pupil Teachers may answer the questions in either the Staff Notation or the Tonic Sol-fa, but *not both*. The questions in the Tonic Sol-fa Notation will be found at the end.)

1. Write major or perfect 5ths above the following notes :—

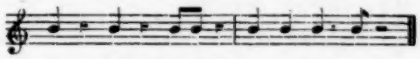


1.



2. Re-write the following, doubling the value of each note and rest :—

2.



3. State, briefly, the meaning of the following expressions :—*Da Capo* ; *Allegro* ; *Crescendo.*

3. *Da Capo*—repeat from the beginning ; *Allegro*—quick, briskly ; *Crescendo*—gradually getting louder.

TONIC SOL-FA NOTATION.

1. Write perfect or major 5ths above (1) *soh* ; (2) *fe* ; (3) *se.*

1. (1) *ray*^{1} ; (2) *de*^{1} ; (3) *re.*

2. Write the following in four-pulse measure, doubling the value of each note and rest :—

$$|1,\ .1,\ :1,1.\quad |1,1.1,1:1\ \ .,1\ \ \|$$

2.

$$|1.\ \ :1.\ \ |1\ .1\ :\quad |1\ .1\ :1\ .1\ |1\ \ :-.1\ \|$$

3. Explain, briefly, the following terms : *Da Capo* ; *Allegro* ; *Crescendo.*

3. *Da Capo*—repeat from the beginning ; *Allegro*—quick, briskly ; *Crescendo*—gradually getting louder.

FOURTH YEAR.

Pupil Teachers at end of Fourth Year.

FIRST PAPER.

Three hours and a half allowed.

Euclid.

MALES.

(*Answer two questions, including No.* 3, *if you can.*)

1. If a straight line be divided into two equal, and also into two unequal parts, the squares on the two unequal parts are together double of the square on half the line, and of the square on the line between the points of section.

Euclid, Book II., Prop. 9.

2. To divide a given straight line into two parts, so that the rectangle contained by the whole and one of the parts may be equal to the sq. on the other part.

Euclid, Book II., Prop. 11.

3. AC and AD are the sides of two squares, of which the sq. on AD is the greater.

Construct a rectangle equal to their difference.

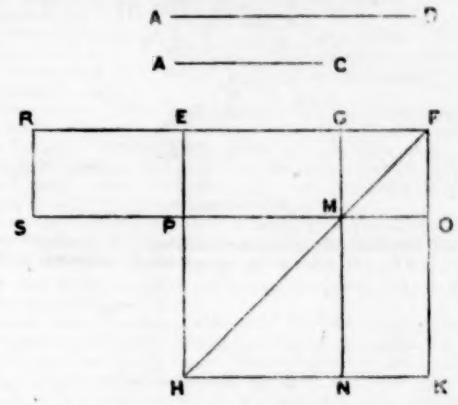
Let AD, AC be the sides respectively of two given squares, of which AD is the greater.

It is required to construct a rectangle equal to the difference of the squares.

Make EF = AD, and cut off EG = AC. Upon EF describe the square EK.

Join FK. Through G draw GMN parallel to EH. Through M draw OMP parallel to EF.

Produce FE to R. Make RE = EG.



Through R draw RS parallel to EH, to meet OMP produced to S. The rectangle RO = diff. between squares AD, AC.

By II. 4, PN = sq. on EG, *i.e.*, sq. on AC, and EK = sq. on EF, *i.e.*, AD (Constr.) ; and gnomon EON is their diff.

And I. 6, rect. RO = gnomon EON.

∴ a rect. RO has been drawn equal to diff. of sqs. AD, AC.

Algebra.

(*Answer two questions, including No.* 1, *if you can.*)

1. What is a quadratic equation? Give a general form for every complete quadratic equation.

How many roots can a quadratic have?

Write down the roots of any complete quadratic.

A quadratic is an equation which contains no power of the unknown quantity greater than the second, and is said to be complete when it can be reduced to three terms, the first containing the second power of the unknown quantity, the second containing the first power of the unknown quantity, and the third containing the known quantity.

The general form for every complete quadratic is $x^2 + px + q = 0$ where p and q stand for any known quantities fractional or integer.

A quadratic can have but two roots.

The roots of any complete quadratic may be represented by

$$\frac{-p+\sqrt{(p^2-4q)}}{2} \text{ and } \frac{-p-\sqrt{(p^2-4q)}}{2}$$

2. Solve the following equations :—

(*a*) $\frac{x+11}{x}+\frac{9+4x}{x^2}=7$

(*b*) $\sqrt{(x+9)}=2\sqrt{x}-3$

(*a*) $\frac{x+11}{x}+\frac{9+4x}{x^2}=7$

$x^2+11x+9+4x=7x^2$

$+6x^2-15x=9$

$x^2-\frac{1}{6}+(\frac{1}{12})^2=\frac{9}{4}+(\frac{1}{12})^2$ or $\frac{11}{12}$.

$x-\frac{1}{12}=\pm\frac{7}{12}$

$x=3$, or $-\frac{1}{2}$. Ans.

(*b*) $\sqrt{(x+9)}=2\sqrt{x}-3$

Squaring $x+9=4x+9-12\sqrt{x}$

Collecting and transposing $-3x=-12\sqrt{x}$

Squaring $9x^2=144x$

$9x=144$

$x=16$. Ans.

3. The sum of two numbers is 8, and the sum of their cubes is 152, what are the numbers?

Let x = one number

y = other number

$x+y=8$ (1)

$x^3+y^3=152$ (2)

From (1) $y=8-x$

$\therefore y^3=(8-x)^3=512-192x+24x^2-x^3$

$\therefore x^3+512-192x+24x^2-x^3=152$

$24x^2-192x=152-512=-360$

$x^2-8x=-15$

$x^2-8x+(4)^2=-15+(4)^2=1$

$x-4=\pm 1$

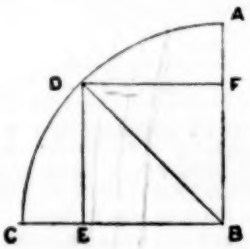
$x=5$

$y=8-5=3.$

$x=5.\quad y=3.$ Ans.

Mensuration.

Find the area of the square inscribed in a quadrant whose radius is 6 ft., two sides of the square being coincident with the radii.



ABC is a quadrant; radii AB, BC=6 ft. Bisect ∠ ABC by line BD (6 ft.). From D drop perpendiculars DE, DF. EF is the sq.

Sq. on DB=6×6=36

Sqs. on DE, EB=sq. on DB (I., 47)

Sq. on DE=sq. on EB (Def.)

∴ Sq. on EB=$\frac{36}{2}$=18. Ans.

Arithmetic.

FEMALES.

1. How many bricks will be required for a wall 25 yards long, 15 feet high, and 1 ft. 10½ in. thick, each brick being 9 in. long, 4½ in. wide, and 3 in. deep.

In. 9 : 25×3 ×12 :: 1 : x

In. 3 : 15×12

In. 4½ : 22½

=30,000 bricks. Ans.

2. What must be the price of the 3 per cents. so that by investing in them I may get 4 per cent. for my money?

If I get £4 for £100, then I shall get £3 for ¾ of 100,

i.e., £75. Ans.

3. If a man after saving ⅛ of his income determine to reduce his expenditure 20 per cent., and thereby finds he has £100 more at the end of the year than he had before, what is his income?

Portion of income originally expended = 1 − ⅛ = ⅞

20 per cent. = ⅕.

Amount now saved = £100, which is ⅞ of ⅘ or $\frac{7}{10}$ of his income.

$\frac{7}{10}$: $\frac{2}{5}$ :: £100 : £625. Ans.

4. What rate per cent. per annum is ¼d. for every pound per day?

¼d. per day = 365 farthings per year.

£100 at 365 farthings per year = 36,500 farthings.

=£38$\frac{1}{4}$. Ans.

Grammar.

MALES AND FEMALES.

Say, doth the dull soil
Quarrel with the proud forests it hath fed,
And feedeth still, more comely than itself?
Can it deny the chiefdom of green groves?
Or shall the tree be envious of the dove
Because it cooeth and hath snowy wings
To wander wherewithal and finds its joys?

1. Analyse the above passage.
2. Paraphrase it.
3. Find from it the words of Latin origin.

ANALYSIS.

Sentence.	Kind of Sentence.	Connective.	Subject.	Predicate.	Object.	Extension of Pred.
(*a*) Say	Princ. Sent.		[Thou]	say		
(*b*) Doth the dull soil quarrel with the proud forests, more comely	N. Sent. to (*a*)		the dull soil	doth quarrel	with the proud forests more comely (ind.)	
(*c*) it hath fed	Adj. S. to (*b*)		it	hath fed	[which]	
(*d*) and feedeth still	Adj. S. to (*b*)	and	[it]	feedeth	[which]	still (time)
(*e*) Can it deny the chiefdom of green groves	N. Sent. to (*a*)		it	can deny	the chiefdom of green groves	
(*f*) or shall the tree be envious of the dove	N. Sent. to (*a*)	or	the tree	shall be envious of the dove		
(*g*) because it cooeth	Adv. S. to (*f*)	because	it	cooeth		
(*h*) and hath snowy wings to wander wherewithal and find its joys	Adv. S. to (*f*)	and	[it]	hath	snowy wings to wander wherewithal and find its joys	
(*i*) than itself.	Adv. S. to (*h*)	than	itself	is comely		

2. The gray earth does not chide the mighty forests which have grown from its breast, and are still growing there. It is impossible for it to deny the paternity of the woods. Nor does the tree become envious of the bird which nestles among its leaves, and has a voice to tell its happiness and wings to fly whithersoever it will.

3. Envious.

4. To what branch of language does English belong? What is the proportion of Saxon words in common speech? Name any writer who used a large proportion of foreign words.

English is a Low German dialect of the Teutonic branch of the Aryan family of languages, and was brought to this country by our forefathers in the fifth and sixth centuries of the Christian era.

From 85 to 95 per cent.

Dr. Johnson.

Geography.

(*Answer two questions, one of which must be Question* 1).

1. Draw a map of one of the following:—
   (1) The Indian Ocean.
   (2) China.
   (3) British North America.

2. Briefly describe the physical features of America.

America consists of two continents, North and South, united by the Isthmus of Panama or Darien. It is 9,000 miles long, and in its widest part 3,000 miles broad. Both divisions taper towards the south. The mountains consist of a great chain running the whole length of the continent, called in S. America the Andes, and in N. America the Rocky Mts. The greatest height is attained in S. America near the Equator. The range lies near the W. coast, and the general slope of the country is towards the east. The Amazon, the longest river in the world,

is in S. America, the other rivers being the Orinoco and the La Plata. In N. America the longest river is the Mississippi, and the others are the Missouri, Rio del Norte, St. Lawrence, Fraser, and Mackenzie. N. America has the largest fresh-water lakes in the world, Superior, Michigan, Huron, Erie, and Ontario, Great Bear Lake, Great Slave Lake, and Winnipeg being the chief. Immense plains called prairies are found in the north, and pampas and selvas in S. America.

3. Describe as to a class the changes the moon undergoes each month.

The moon is a dark body and has no light of its own. It reflects the light it receives from the sun, as a reflector behind a gas jet. That side only is illuminated which is turned towards the sun. The moon does not always remain in one place, but travels round the earth once a month. At one time, therefore, the illuminated side of the moon is turned from the earth, and we see no reflection at all. When it is on the side of the earth opposite from the sun then the whole illuminated surface is seen, and it is said to be full moon. A little more than fourteen days pass before the moon can occupy these two positions. Between the time when no moon at all is seen and full moon, various appearances are seen gradually increasing from a slight crescent to full moon, and during the time from full moon to new moon the same appearances are seen in reverse order. When less than half the surface of the moon is seen it is said to be *horned*, when more than half is seen it is called gibbous.

SECOND PAPER.

Two hours and a half allowed.

Needlework.

FEMALES.

The needlework specimens will be collected by the Inspector at the expiration of one hour after the distribution of the examination paper.

Arithmetic.

MALES.

1. A man purchases £700 stock in the 3 per cents. at 94½, and then invests £585 in 5 per cents. at 97½. How much stock has he standing in his name, and if he sells the 3 per cents. at 95 and the 5 per cents. at 96½, how much does he lose?

£585 will purchase $\frac{585 \times 100}{97\frac{1}{2}} = £600$

Total stock = £700 + £600 = £1300

By selling the 3 per cents. he gains $(95 - 94\frac{1}{2})7 = £3\frac{1}{2}$
By selling the 5 per cents. he loses $(97\frac{1}{2} - 96\frac{1}{2})6 = £7\frac{1}{2}$
Loss = $7\frac{1}{2} - 3\frac{1}{2} = £4$. Ans.

2. A person having to pay £402 3s. 9d. two years hence, invests a certain sum in the 3 per cents., and also an equal sum next year with the interest already received. Supposing the price of consols to remain at 96 throughout, what must be the sum invested to pay the debt?

£1 in 1 year becomes $(£1 + £\frac{3}{96})$.
And $(£2 + \frac{3}{96})$ becomes $(£2 + \frac{3}{96})\frac{99}{96}$ at the end of the second year.
∴ £402 3s. 9d. ÷ $(£2 + \frac{3}{96})\frac{99}{96} = 192$.
Sum invested = £192. Ans.

3. An Egyptian piastre is worth 2½d., but a 50 gold piastre piece is worth only 10s. 2½d. What do I lose by paying 1000 piastres in gold piastres?

1000 piastres at 2½d. =	£10	8	4
1000 piastres at 50 for 10s. 2½d. =	10	4	2
Loss		4	2

4. *A* has £200 more in the business than *B*, but *B* has his five months and *A* only four. If *A* receive £30 more than *B* out of £210 profits, find the amount invested by each.

£210 − £30 = £180
£180 ÷ 2 = £90 for *B*.
$\frac{90}{5}$ = £18 per mo.
£120 ÷ 4 = £30 per mo *A*.
Diff. = £12.
12 : 30 :: £200 : £500 *A*.
12 : 18 :: £200 : £300 *B*.

History.

MALES AND FEMALES.

1. What was the character of Queen Anne? Give some reasons for calling her 'good Queen Anne.'

Queen Anne was popular because she was English. She had a strict sense of duty, great rectitude of purpose, was exemplary in her conduct as a woman, wife, and mother, generous as a friend and Queen.

She devoted £100,000 of the Civil List to the reduction of the taxes. She gave up first-fruits and tithes for the benefit of the Church, thus depriving herself of £15,000 a year. She presented early in the reign £2,000 a-year to the Duke of Marlborough when Parliament did not give him what she thought sufficient remuneration for his services.

She was, however, a woman of strong prejudices, and allowed herself to be guided by others, notably, the Duchess of Marlborough and Mrs. Masham.

2. Give some account of the various discoveries and inventions of the present century.

The following are some of the chief discoveries and inventions of the present century:—The steam-engine, the steam-ship, the locomotive, the lucifer match, sewing-machine, electric telegraph, telephone, machinery for spinning, and weaving, steam plough, agricultural machinery, photography, and printing in colours, armour-plated ships, instead of wood; firearms have been perfected, and guns greatly increased in power, and torpedoes invented.

3. Who were the Huguenots? What was the Edict of Nantes?

The Huguenots were the French Protestants who, under the Edict of Nantes, had enjoyed a considerable amount of religious liberty. It was so called from the place whence it was promulgated. In 1685 Louis XIV. revoked it, and in consequence the Huguenots were fiercely persecuted, thousands of industrious men fled from France, and by their skill enriched other countries. Many settled in London and introduced the manufacture of silk. Others joined the Army of William of Orange and fought against Louis. The effect of the revocation of the Edict was to stir up the English people to withstand James II., who was following in Louis's footsteps.

Teaching.

Write notes of a lesson on 'Springs.'

Definition.—Water springing from the earth.

Kinds of Springs.—(*a*) Surface springs. (*b*) Deep-seated springs.

(*a*) The first depend for their supply on a frequent rainfall, are very feeble, often dry in summer, and copious in winter.

(*b*) Deep-seated springs: Water percolates through the earth, and collects in large quantity, which forces its way to the surface on the side of the hill, or in a valley. Some springs are *intermittent*, so called because they well up at intervals and then subside. Others are perennial, always flowing. Some are called mineral springs, because they are impregnated with various minerals.

Uses of Springs.—The sources of rivers; chief supply of water in many places; as medicine.

Curious Springs.—Geysers of Iceland and America.

Music.

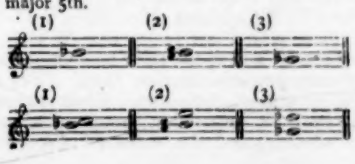
OLD NOTATION.

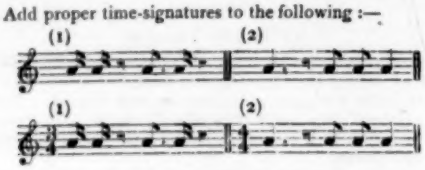
A quarter of an hour allowed for this paper.

(N.B.—Pupil Teachers may answer the questions in either the Staff Notation or the Tonic Sol-fa, but *not both*. The questions in the Tonic Sol-fa Notation will be found at the end.)

1. What is the minor 6th in the scale of D minor, and the major or sharpened 7th in the scale of A minor?

1. The minor 6th in D minor is B♮; the major 7th in A minor is G♯.

2. Write above (1) a major 2nd; (2) an imperfect 4th; (3) a perfect or major 5th.

3. Add proper time-signatures to the following :—



TONIC SOL-FA NOTATION.

1. Write above (1) *ta* a major 2nd ; above (2) *de* an imperfect 4th ; above (3) *fe* a perfect or major 5th.

1. (1) *doh*^{1} ; (2) *fah* ; (3) *de*^{1}.

2. Write in order the different forms of the minor mode.

2.
l, t, d r m f s l
l, t, d r m f se l } Ascending.
l, t, d r m ba se l
l s f m r d t, l, Descending.

3. Write the following in six-pulse measure by trebling the value of each note :—

3.
|m .- .m :r |m .s .f :m ‖
|m :- :m |r :- :- |m :s :f |m :- :- ‖

Books of the Month.

When Dante wrote his 'Inferno,' he forgot to pillory for ever in his 'burning couplets' one great class of criminals—or rather he failed to foresee such a class would ever arise—that of the novel writers. We are not cruel or vindictive, yet we confess we would like to see some law insisting that all novelists should, for, at least, a brief period, be forced to read each other's productions. The result would be a happier life for the long-suffering reviewer.

***

First of all we would like to enter a mild protest against the fever that has seized upon writers and publishers in their wild desire to score another success like that of Hugh Conway with 'Called Back.' 'Recalled,' 'The Dark House,' 'Forewarned,' 'Struck Down,' 'Fort Minster,' and I know not how many others, all feeble copies of a feeble work 'tread upon each other's heel, so fast they follow.' We have tried hard to work through some of these, but frankly confess we were not equal to the task. There may be persons with a taste for these ill-written and utterly uninteresting productions. But it is one we cannot pretend to share, or even to understand. The detective, professional or amateur, does not appeal to our sympathies. He is not a 'hero' we care for.

***

'A Rainy June' is a clever little story by Ouida. It is told in a series of letters, supposed to be written by or to the chief *dramatis personæ*. This is one of the most difficult methods of telling a story. It is not easy for one person to write various styles, and yet if we are to take any real interest in the individuals portrayed by their letters, we must feel they were written by, not for, them. This method is especially perilous for Ouida, whose style is unmistakable. 'A Rainy June' is, however, an amusing work, albeit sad enough at bottom. An Italian noble—and need we say that, being a creation of Ouida's, he is an Adonis and a Crœsus in one?—falls desperately in love with a fair young English girl ; she with him. They marry, and spend their honeymoon at a lonely English country house in 'a rainy June.' They had really known nothing one of the other. Their natures, tastes, education, make it impossible they ever should understand one another, and the enforced *tête-à-tête* of that wet June ends in mutual disillusion. The whole story is cleverly managed, and for Ouida not objectionable. We would only point out that neither her Italian nobles nor English *grandes dames* seem able to write a line of French correctly—but perhaps 'that's the humour of it.'

***

'The Flower of Doom,' by M. Betham Edwardes, is a volume containing several stories, some supposed to be tragic, others in the comic vein. On the whole, the tragic, being *very* funny, strike us as the less depressing. They are as indescribably droll as the 'comic' one is dull. Altogether it would be difficult to find a book written in worse style or full of falser sentiment.

***

Mr. Black's 'Wise Women of Inverness and other Stories' are disappointing. If the author were not Mr. Black, we should probably be delighted and give no little praise to this volume. But it is not worthy the author of 'A Daughter of Heth,' and so many other delightful works. Saddest of all, perhaps, is, 'A few Days' more Driving.' It reminds us too painfully of the inimitable 'Adventures of a Phaeton,' and we cannot but note the falling-off. Still, Mr. Black always writes good English, his descriptions are pleasant, and he is never vulgar : three qualities rare enough.

***

'Colonel Enderby's Wife,' by 'Lucas Malet,' is a not uninteresting story. There is promise in it of far better things to come. The wife of the Colonel is a really clever study, and in one scene at least the author touches almost upon tragedy. It is not the scene where the Colonel dances his sad 'dance of death,' though this is powerful, but that other scene where, just for one brief moment, the better nature of the woman is half aroused. But neither she nor the husband who loves her understands, and the opportunity is lost, and we who look on can only say, 'The pity of it.' Cecilia Farrell and her unbearable mother are clever sketches ; Cecilia, indeed, is more than a sketch. Mrs. Pierce Dawney just fails to produce the effect evidently intended, while Mr. Bertie Amery is a complete failure. The Colonel himself is not drawn without talent or even strength ; but there is something wanting—that last touch that gives life and reality. Still, 'Colonel Enderby's Wife' is a book to be thankful for in the general dearth.

***

'Madame de Presnel' we struggled with manfully, but, truth to tell, we found the flesh weak, though the spirit was willing. We must cry *peccavimus*, and confess that after reading most of the first volume, we broke down completely over the second. The plot is preposterously stupid, and the whole like Peter Bell, 'dull, so dull, so very dull.'

***

'A Woman's Reputation' is, in its way, clever, but far too long drawn out, and many of the 'characters' are too much mere caricatures. But the hero, James Scatchard, is so powerful that we forgive many faults. The whole conception of the man's nature is original, and his creator has not merely succeeded in making us feel what he wanted to do. He has done it, and Scatchard becomes something more than a sketch. We feel he is *real*. Excellent, too, is the heroine, the actress, Viola Templeton. It is a great pity that Mr. Crawford did not condense his story, and that he spoilt it by the introduction of the 'Professor' Alice Peacocke.

***

Mrs. Lynn Linton's latest work is not an easy one to criticise. Being Mrs. Linton's it is, of course, written in vigorous, idiomatic English—a quality that the readers of ordinary novels cannot appreciate too highly. But while we willingly admit the excellency of the manner, we feel bound to confess that the matter is more than disappointing. It is positively unpleasant. As a matter of fact, 'The Autobiography of Christopher Kirkland' is nothing

but a series of personal reminiscences of Mrs. Linton's. Her attacks, veiled or open, upon many well-known persons, her vilification of George Henry Lewes would be bad enough if they appeared in a volume of memoirs. But here Mrs. Linton attacks men and women from behind an imaginary character. She may plead that not *she* thinks thus, but that Christopher Kirkland, a creation of her mind, and no more herself than the Corsair was Byron, feels in this manner. As a novel the work is worthless. There are two or three 'ideal' women; some very unpleasant ones, whom Mrs. Linton thinks 'real'; all equally tiresome. The men, if possible, are worse, and we feel grateful that such a creature as Kirkland could never have existed. The whole leaves us with an impression of pain and regret, and, despite 'real characters,' unreality. Mrs. Lynn Linton is so much too good for work like this!

***

From books like these it is with a sense of unspeakable relief that we turn to such a one as Mr. Heath's 'Fern World.' We can say nothing more of the book than that it is worthy of its subject. It has only one fault. It makes the weary Londoner too anxious to be off to Devonshire, and to start fern-collecting there and then. Every sense is gratified by such a book as this, and we feel grateful to Mr. Heath for it.

***

General Gordon's 'Journal' has appeared. It is not a book that calls for literary criticism; and probably by this time every one has read, and knows 'all about' it.

***

A very charming book, and one that young and old will equally delight in, is the 'Life of Frank Buckland.' In 1846 Buckland wrote: 'My object in studying medicine is not to gain a name, money, and high practice, but to do good to my fellow-creatures, and assist them in the hour of need.' This noble object he attained, and he 'gained a name' also. As scientist, we may differ from Buckland, who was one of the few naturalists who did not accept the teaching of Darwin. But he was an earnest worker—a sincere and lovable man. His 'Life' should be read by every one. Apart from more serious interest, it is full of amusing anecdotes.

***

Mr. F. S. Pulling is a wise man. He has just published two volumes of the 'Life and Speeches of the Marquis of Salisbury'—a very well-timed publication. It is sure to be largely read.

***

A book that every one interested in art, or in the most sympathetic of all artists, should read is Messrs. Crowe and Cavalcasalle's 'Life and Works of Raphael,' now completed after an interval between the first and second volumes of three years. Of the value of this 'Life' there can be no doubt. We only regret that it contains no fac-similes or engravings, both so useful in a work of this kind.

***

Those—and they are many—for whom 'the Press' has a peculiar fascination, should look at Thomas Allan Reed's 'Leaves from a Note Book.' Mr. Reed is a short-hand reporter, and his book is full of good things.

***

'Literary Landmarks of London' should be a great success. Some such work was much wanted. To walk through London with Mr. Laurence Hutton is to live again with all the great men and women of the past. We advise every reader to get this carefully-compiled book, and with it in hand make a pilgrimage through London.

***

Of the magazines this month there is not much to be said. Victor Hugo occupies a conspicuous place in most of them, and, amid all the exaggerated nonsense and high-flown talk we have been treated to, it is refreshing to come across at once so able and so honest a critique as that of M. Céard in the 'Fortnightly.'

—o—

Publications Received.

Bell (G.) and Sons—
French Examination Papers. By A. M. M. Stedman, M.A.

Blackie and Son—
Lessons in the Art of Illuminating. Parts 1 to 4. By W. J. Loftie, B.A., F.S.A. (Vere Foster's Drawing Books).
Map-Drawing Copies for School and Home Use.

Cassell and Co., Limited—
Cassell's Readable Readers. Standards III., IV., V. and VI.

Grant and Co.—
The New Code, 1885. Edited by Richard Gowing.

Laurie (T.)—
Laurie's Kensington Test Cards. Standards III. to VII.

Letts, Son and Co., Limited—
Letts's Illustrated Household Magazine. July.

Longmans and Co.—
Longman's Magazine. July and August.
The Wanderings of Ulysses. Translated by Prof. C. Witt.
Longman's Geographical Reading Book, Europe and America.
Our Dwellings, Healthy and Unhealthy. By C. M. Buckton.

Marcus Ward and Co.—
The Oriel Readers. Standard III.

Marshall (J.) and Co.—
The Infant Action-Song and Recitation Book. Parts 2 and 3.

Murby (T.)—
The Acme Drawing Cards. First Grade Freehand. By James Wadey.
Wadey's Geometrical Test Papers, First Grade.

Nelson (T.) and Sons—
A Complete Arithmetic with Answers (Royal School Series).

Philip (G.) and Son—
Philip's Grammar School Atlas.

Relfe Bros.—
Cæsar De Bello Gallico, Book I. By J. Hugh Hawley.

Smith, Elder and Co.—
School Hygiene. By R. Farquharson, M.P.
The Cornhill Magazine. July.

Swan Sonnenschein and Co.—
British Butterflies, Moths, and Beetles. By W. F. Kirby.
Scientific Romances, No. 2. By C. H. Hinton, B.A.
First Three Years of Childhood. By Bernard Perez.

—o—

Gossip.

Mr. Ablett will resume his articles on 'Drawing' in our next issue. They have been suspended this month owing to the heavy professional engagements of the author.

As these papers have at the present time a peculiar interest and value, we trust our readers will make them known as widely as possible among their professional friends.

***

A new feature—our Exchange Column—one that has been repeatedly asked for, makes its appearance in another part of this number of the PRACTICAL TEACHER. We hope our numerous subscribers will avail themselves of this convenient means of buying and selling what they want.

With a view to keep up a good old custom, we invited a gentleman in 'authority' to telegraph to us at the earliest moment the name and address of the top-man in the recent Matriculation Examination at the London University. Here is his reply:—'*The top-man is a* WOMAN.'

***

Upon consideration, we have decided to break through our rule, and give *Model Answers to every question in every subject.* To the hardworking student, who often has to plod along unaided, this rule will, we feel sure, for once in a way, be honoured in the breach. We may add that Dr. Aveling, the gentleman who has kindly undertaken to prepare the answers, has for many years past been a singularly successful 'coach.'

***

It is not unlikely that during the autumn a new educational weekly will be issued from this office. From what we hear of this new venture it should find its way into every school in the country.

***

Speaking of new papers reminds us that *Choice Chips* is now published at the office of the PRACTICAL TEACHER. This popular weekly has been enclosed in wrapper and cut. It is ably edited by Mr. W. Davenport Adams, the author of a dozen or more well-known works. *Choice Chips* contains the cream of the literature of the day, and is entirely distinct in character from every other weekly paper. Money prizes are given for the best English, Scotch, and Irish chips. We understand that several teachers have already been successful in these competitions.

The 'Practical Teacher' Sale and Exchange Column.

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Inglis' Book-keeping	3	6
Civil Service Spelling and Précis	3	6
Gill's Geometry	0	9
Nesbit's Mensuration...	6	0
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